US Army Health Service Support in 2025

A Monograph

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The US Army Medical Department (AMEDD) is in the process of developing new concepts to support the Army's transformation. Its current mission is to *conserve the fighting strength of US Army forces,* providing force health protection to forces in a theater of operations; however, what about the future? *What are the changes required to support the Army Future Force of 2025?* The purpose of this monograph is to conduct a holistical examination of the US Army's medical functional areas starting with the Vietnam War and includes a current medical analysis of the US Army Future Force. The monograph considers not only historical trends from past reports, but also examination of a Future Force scenario by applying systematic analysis of Level 1 through 3 health care. The result is the capture of critical medical issues associated with medical support to support the Future Force in a contemporary environment.

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Abstract

US Army Health Support in 2025, by MAJ Keith A. Rigdon, US Army, 101 pages.

The US Army Medical Department (AMEDD) is in the process of developing new concepts to support the Army's transformation. Its current mission is to *conserve the fighting strength of US Army forces*, providing force health protection to forces in a theater of operations; however, what about the future? *What are the changes required to support the Army Future Force of 2025?* The purpose of this monograph is to conduct a holistical examination of the US Army's medical functional areas starting with the Vietnam War and includes a current medical analysis of the US Army Future Force. The monograph considers not only historical trends from past reports, but also examination of a Future Force scenario by applying systematic analysis of Level 1 through 3 health care. The result is the capture of critical medical issues associated with medical support to support the Future Force in a contemporary environment.

As the AMEDD transforms its medical structure, it must consider that when planning medical support in the contemporary environment it must be able to understand the situation within a theater of operations (TO). It must possess an ability to monitor and manage its resources effectively while maintaining its flexibility. It must also be able to adequately develop, alert and deploy tailored medical support packages, which fully support the tactical commander's mission. The key to accomplishing this will be a joint command and control information system (IS) that acts as the key link between commanders in all services, to include health care providers and medical elements at all echelons. The system must not be a stove piped system, which fails to integrate all services, but be a key enabler in synchronizing and monitoring to include positioning of medical support and supplies to best support the mission of the tactical commander.

Another key component will be the joint service integration not only of our medical systems and equipment but also in our planning, execution and command and control of future operations. To accomplish this we must consider an overall Joint Medical Commander, which allows for the integration and synchronization of joint health care when supporting an area of operations (AO). The Joint Medical Commander must ensure far forward medical and surgical care to include the integration of medical systems to assist in the rapid evacuation and treatment of forces within theater. The commander's primary task will be focusing on and ensuring the seamless integration of joint medical support, from point of injury to the highest level of care, more importantly the integration of all health care providers, medical diagnostic systems, information, and command and control systems at all echelons.

A final and critical component will be the integration of future technology in treating our soldiers. It will create revolutionary changes to medical equipment, systems and evacuation platforms, as we now possess in our inventory. It will also contribute to the creation and transformation of our current medicinal procedures. Nonetheless, Force Health Protection in a Global Environment (FHPGE) will be vital in ensuring the health of our forces from point of injury to CONUS. However, it is our responsibility to take not only these historical trends but also a realistical analysis of the future and determine the concepts, systems and procedures required for the US Army Future Force of 2025.

Table of Contents

Table of Figures

Table of Tables

CHAPTER I

Introduction

"We cannot transform our military using old weapons and old plans. Nor can we do it with an old mindset that frustrates the creativity and entrepreneurship that a 21st Century military will need."[1]

G.W. Bush, May 25, 2001, during commencement at the US Naval Academy

Currently, our nation is at war. The Global War on Terrorism (GWOT) and the security of our homeland presents a future of uncertainty in the commitment of our forces. However, faced with a multipolar and complex environment, the United States must be ready to confront these future challenges. To answer this call, the US Army requires a transformation in its current organization. This transformation requires a change to a highly flexible force, which enables our forces to react to uncertainties throughout the world. The transformation will encompass changes that will allow our forces to dominate in all spectrums of operations. However, as the force begins its transition to the Army Future Force, how will its medical support change to support the force in 2025? The US Army Medical Department (AMEDD) is in the process of developing new concepts to support the Army's transformation. So, what are the changes required to support the Army Future Force of 2025? Part of the answer might be a reliance on technology and its integration in the years to come. Current research argues that in only 10-20 years this technology will revolutionize medicine, as we know it. Some critics argue that medical support in the future will be essentially a joint-interdependent function; and that it will be only a matter of coordination and synchronization between the uniformed services. However, some state that medical support in the Army's Future Force lies in a change of modularity and its synchronization on

[1] Jim Garamone. "Bush Says New Military Needs Innovators." *American Forces Press Service*, 2001. Retrieved September 28, 2003 from United States Department of Defense Website: http://www.thepowerhour.com/ articles/ transformation.htm

the battlefield. What about our past, does the past hold any viable lessons for the future? Are there historical lessons that we can carry forward to support our future concepts?

The overall intent of the monograph is to identify potential trends within the AMEDD's HSS functional areas and then relate those trends as possible issues in the US Army's Future Force. The methodology used in this monograph begins by defining the US Army Health Service Support (HSS) concept in its current terms, immediately followed with an examination of Level 1 through 3 health care. The analysis starts with in-depth study of the Vietnam War (1965-1973) and follows with Operation JUST CAUSE (Panama, December 20, 1989-January 8, 1990), Operation DESERT STORM (Iraq, January 17-January 1, 1992), and Operation UPHOLD DEMOCRACY (Haiti, September 19, 1994 – March 31, 1995). It also includes an analysis of United States Peace-enforcement Operations within the Balkans (December 1995 to present), Operation ENDURING FREEDOM (Afghanistan, 2001 to present) and Operation IRAQI FREEDOM (Iraq, 2003 to present) and the difficulties of providing medical support to disaster relief operations (Hurricane Andrew and Mitch). The significance of the analysis reflects critical lessons of medical support in a full spectrum environment.

To understand the implications of medical support in the future, we must not only study the past, but we must attempt to look to the future. The monograph considers the medical issues associated with the US Army Future Force, by applying a futuristic scenario and a systems analysis, thus capturing critical medical issues associated with health care in the contemporary environment.

CHAPTER II

The Historical Lessons of Medical Support since the Vietnam War

The US AMEDD's mission is to *conserve the fighting strength of US Army forces* and provides force health protection to forces in a theater of operations. However, to understand HSS we must define the system and the meaning of the concept of *Force Health Protection in a Global Environment.* There must also be an appreciation of the systems goals to include the means of measuring its effectiveness. Finally, there should be a general knowledge of the medical functional areas and levels of medical care in the health service support system.

The US Army Field Manual (FM) 4-02, *Force Health Protection in a Global Environment*, defines HSS as a system, which executes the concept of force health protection while in a global environment and includes all services performed, provided, or arranged to promote, improve, conserve, or restore the mental or physical well being of personnel in the Army. Of note, the joint medical community also uses the term of health service support to describe the joint military health system.[2] The doctrinal term, force health protection in a global environment (FHPGE), is a process performed by the health service support system; [it] includes all support and services performed, provided, or arranged by the AMEDD to promote, improve, conserve, or restore the mental or physical well-being of personnel in the Army and, as directed, in other Services, agencies, and organizations. [3] Force Health Protection is the overarching concept of support in providing timely medical support to the tactical commander; executed by the HSS system.

The HSS concept currently focuses on either treating a patient as close to their unit as possible or returning the soldier back to his unit. If unable to return to duty (RTD), then there is an evacuation rearward for further treatment. Of note is that by current doctrine, a casualty either will be RTD or

[2] Headquarter, Department of the Army. *Force Health Protection in a Global Environment*, Field Manual 4-02. Washington, DC: February 13, 2003, Glossary 11.

[3] Ibid., 2-1.

evacuated through successive echelons that have increasing capabilities.[4] In fact, the current concept to support force projection operations has shifted to providing only the *essential care* needed within a theater [to] evacuating patients to CONUS or another safe haven for *definitive care*. [5]

The key to planning successful medical operations depends on accurate casualty estimates. These estimates are a crucial tool and provide the critical information in determining medical requirements for a theater of operation. The estimate defines the population at risk (PAR) in relation to the medical threat and intelligence preparation of the battlefield and thus derives the medical requirements needed to support the force. Medical planners will then subdivide the casualties into battle injury, non-battle injury, and disease. This categorization allows planners to better focus their medical assets on treating casualties. Historically, most casualties result from disease or a hostile environment, but with improvements in preventive medicine, battle injuries (wounds) are now increasing proportionately.[6] Once the casualty estimates are complete and divided into types of diseases and injuries expected at various echelons of care, the planners attempt to place the appropriate medical assets to meet operational requirements.[7]

The overall focus of HSS is on decreasing both the mortality and morbidity rates. Combat mortality falls into two sub-categories either killed in action or died of wounds. [8] The term Killed in Action (KIA) is used when a soldier dies before he or she enters the medical system. The lowest level physician staffed entry point for the medical system is the battalion aid station (BAS). The term Died of Wounds (DOW) is used when a soldier expires after reaching a battalion aid station.[9] Therefore, the

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[4] Ronald F. Bellamy, "Combat Trauma Overview," in Anesthesia and Preoperative Care of the Combat Casualty," *Textbook of Military Medicine Series* (Washington, DC: Borden Institute Press, 1996), 32.

[5] FM 4-02, 1-1.

[6] Bellamy, 4, 38.

[7] G. Jay Walker and Christopher G. Blood. "The Patient Flow of Marine Disease and Nonbattle Injury Conditions within a Multi-Echelon System of Care." *Military Medicine* 164 (October 1999): 731.

[8] Bellamy highlights data from recent wars and indicates that about 20% to 25% of the US casualty population are classified as KIA. However, 70% to 80% die within the first few minutes after receiving their wound and placed in the classification as killed in action, while 3% to 5% die of wounds after reaching a medical treatment facility, 39.

[9] Richard Holmes. *Acts of War: The Behavior of Men in Battle (*New York: The Free Press, 1985). Holmes confirms that the DOW rate was 4.5% in World War II, 2.5% in Korea and 2% in Vietnam. He also notes that during World War II, intra-abdominal injury was the most common cause of DOW while in the Vietnam War; head

overall goal of the HSS system is to eliminate the DOW rate and to reduce the KIA rate as much as possible.[10]

Colonel Steven Gouge, *Combat Health Support in 2015*, highlights that measuring the effectiveness of a medical system; one would measure the total mortality rates and not the DOW rates. He reminds us that the goal of medical support under battlefield conditions is the rapid evacuation of casualties off the battlefield; and that the evacuated casualty should arrive at a treatment facility capable of providing the appropriate medical care. He also notes that treatment capability does not equal treatment effectiveness. That an improvement in capabilities may not enhance the overall effectiveness (i.e., reduce morbidity or mortality) of an MTF, but will only increase its overall medical footprint. HSS seeks to position the required, effective capability as close as possible to the point of injury in order to reduce the mortality rates.[11]

Although rapid evacuation is very desirable, the commonly accepted standard of the *"Golden Hour,"* reaching a surgeon within one hour of injury, is not a valid expectation when in a combat environment.[12] Colonel Gouge states that basis of the *"Golden Hour"* focuses on studies when blunt (non-penetrating) trauma predominates and results in about 30% of deaths within one to three hours after injury. He states that in combat trauma, 90% of the deaths will occur before arrival at a MTF. The probable explanation is the result of rapid blood loss from a penetrating injury.[13] This also confirms the essential need for rapid evacuation for severely injured soldiers who would otherwise die between the

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wounds comprised the largest DOW category. He notes that the reduction was due to the implementation of body armor during the Vietnam War, 193-195.

[10] Bellamy indicates that since World War II, over 90% of U.S., combat deaths have been KIA and that the DOW rate has declined since the Korean War due to the introduction and rapid evacuation of helicopters, 13.

[11] Col. Steven F. Gouge. *Combat Health Support of the Transformation Force in 2015*. Strategy Research Project (Carlisle Barracks: U.S. Army War College, April 1, 2001), 5.

[12] Bellamy states the term *"golden hour"* is more appropriate when discussing the timing of resuscitative care for blunt-trauma victims and does not accurately convey the urgency of care required for penetrating trauma. He also notes that penetrating trauma cause 90% of combat injuries and is more of a common characteristic of a combat casualty. As far as the term *"golden hour,"* the US Army often uses the term because it signifies the necessity for rapid care and evacuation of combat casualties, 1-41.

[13] Gough highlights in *Combat Health Support in 2015* (6) that two-thirds of deaths occur immediately or within 5 minutes, and another 15% are within 30 minutes. He also notes that 5% to 25% of deaths occur between 30 minutes and 6 hours, with half of those deaths occurring in the first two hours.

times of 30 minutes to six hours after injury; it is also critical in preventing prolonged shock, which normally occurs in late deaths due to multiple organ failure and the spread of bacteria or infection.[14] In fact, experts highlight that early treatment of shock and removal of infectious foci are essential in preventing multi-system organ failure; however, it still requires prolonged intensive care and maintains a 60% mortality rate.[15] Unless casualties receive stabilizing care (Advanced Trauma Life Support (ATLS)) within the first hour, many will not survive until surgery, even if after receiving adequate self/buddy aid at the point of injury.[16]

In Gouge's analysis, combat casualties have a tri-modal distribution of severity. About 40-50% will be minor; 25-35% will be medium severity requiring surgical treatment for recovery.[17] Twenty to twenty-five per cent of the combat casualties will be severely injured and will expire without prompt treatment; and in some cases, members of this group will perish even with the best treatment.[18] The casualty distribution previously mentioned thus argues for a "*Principle of Selectivity"* when providing medical support and translates into treating the minimally injured in the forward battle area while rapidly removing the severely injured from the battle area.[19]

As medical planners begin to develop an executable medical plan, they must also consider some basic characteristics of organizing medical assets. They must ensure the proper distribution of medical resources to include medical capabilities at various levels of the battlefield. This refers to the doctrinal term called *level of care*. As a rule, a patient *will not bypass a level of care* except on grounds of efficiency or battlefield expediency. The rationale is to ensure the stabilization and survivability of the patient through advanced trauma management (ATM) and far forward resuscitative surgery, which

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[14] Bellamy, 16-17.

[15] Malcolm M. DeCamp and Robert H. Demling. "Concepts in Emergency and Critical Care: Post-traumatic Multisystem Organ Failure." *Journal of the American Medical Association* 250 (22/29 July 1988): 530-533.

[16] Barry W. Wolcott. *Combat Medicine: Expensive Humanitarian Effort or Combat Multiplier?* Strategy Research Project (Carlisle Barracks: U.S. Army War College, 1 April 1985), 21.

[17] Gough, 6.

[18] Bellamy, 26-28.

[19] Wolcott, 26-27.

normally occurs before the movement of the patient between MTFs (Levels 1 through 3). Definitions of HSS levels of care are at Table 1.

Theater evacuation policy is also a crucial concern with respect to medical support. The theater evacuation policy, established by the Secretary of Defense upon recommendation by the theater surgeon, defines the maximum number of days a patient can stay in MTF located in a theater of operations. Dupuy highlights that an enemy threat, to include potential weapon capabilities, within a theater of operations can help determine a policy covering theater evacuation of patients. Dupuy also noted that during the *"Battle of the Bulge,"* due to rapid German advances, US hospitals were at threat and caused a change in the US evacuation policy from a 72-hour evacuation to an immediate evacuation of patients to the Communications Zone (COMMZ).[20] However, since the Vietnam War, the theater evacuation policy has ranged from 0-30 days.

What is important in reference to the theater evacuation policy is that the fewer the theater treatment days allowed by policy, the higher the proportion of patients who must be evacuated to the zone of interior (ZI). This also correlates to fewer medical resources needed in theater and fewer patients returning to duty. Another significant note is that a small theater evacuation policy will normally place a higher demand on US Air Force for air evacuation assets; however, increasing the length of the evacuation policy within theater leads to a decrease in the number of patients evacuated, but an increase in the number of medical resources in theater. There will also be an increase in theater of the number of patients returned to duty in theater. Nonetheless, a patient may stay in theater longer than the established evacuation policy due to potential injury and risk of mortality during evacuation.[21]

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[20] Trevor N. Dupuy. *ATTRITION: Forecasting Battle Casualties and Equipment Losses in Modern War.* Hero Books, Fairfax VA: 1990, 17. The nature of the full spectrum operations has a tremendous impact on the theater evacuation policy. Factors include the duration of the operations to include its size of the force, the possible use of CBERNE, the types of conventional weapons and if the situation is static or not, Department of the Army, *Planning Health Service Support in a Theater of Operation*, Field Manual 8-55. Washington, DC: February 13, 2003, 4-2.

[21] FM 8-55, 4-1.

Table 1 Echelons of Medical Care[22]

Level of Care	Type of Care	Location
Level 1	▪ The first medical care an injured, ill, or wounded soldier receives *(Stop bleeding and start IV).* ▪ A trauma specialist provides EMT at the point of injury or wounding. *(Airway, Bleeding and Circulation)* ▪ Evacuate patient to the BAS *(MTF established by the treatment platoon of the maneuver unit).* ▪ At BAS, patient receives ATM. ▪ Patient RTD or stabilized for evacuation to the rear.	▪ Self Aid/Buddy Aid, Combat Lifesaver (POI) ▪ Combat Medic (Company/Unit Location) ▪ BAS (Maneuver Unit Combat Trains)
Level 2	▪ Level 2 is a continuation of the medical treatment received at the BAS. ▪ MTF has enhanced stabilization of the patient for further evacuation to the rear. ▪ Augmentation of Forward Surgical Team (FST) allows for requiring far forward *resuscitative* surgery.	▪ Forward/Main Support Medical Company (BSA/DSA) ▪ Area Support Medical Company (Div/Corps/Theater)
Level 3	▪ The entry point into the theater hospitalization system. ▪ Expands the support provided at Level 2. ▪ Patient receives all categories of care as required *(resuscitation, initial wound surgery, and postoperative treatment).* ▪ Expands the support provided at Level 2. ▪ Patients receive surgical care when unable to tolerate and survive movement over long distances.	▪ Combat Support Hospital (METT-TC Dependent, primarily Corps Area)
Level 4	▪ METT-TC determines location of Level 4 units, may not be in the theater of operations (TO). ▪ Provides definitive and restorative/surgical care. Has subspecialty care *(neuro, eye, urology, etc.).*	▪ Combat Support Hospital (METT-TC dependent, normally outside the TO)
Level 5	▪ The foundation of Level 5 medical is in the support base hospitals. ▪ *Total Care* - Represent the most definitive medical care available within the HSS system. ▪ Mobilization requires expansion of military hospital capacities, Department of Veterans Affairs (VA) and civilian hospital beds to meet the increased demands created by the evacuation of patients from the TO.	▪ MEDDAC, MEDCEN, VA (CONUS)

[22] FM 4-02, 2-5 to 2-7.

Another vital consideration when planning medical support is the integration of the HSS functional areas. These functional areas help in delineating clinical and support functions required in a theater of operations. The areas include medical evacuation and medical regulating, hospitalization, medical treatment [includes area medical support], preventive medicine (PVNTMED) support, dental services, veterinary services, heath service logistics (HSL), Combat Stress Control (COSC), and medical laboratory services, and medical command, control, communications, computers, and intelligence (C4I). To maximize the effectiveness and efficiency of the HSS system, a planner must consider all functional areas in the planning process. [23] The execution of the HSS mission and the implementation of programs within the functional areas are essential in providing health care delivery on the battlefield.[24] Under the current FHPGE approach, the alignment of these functional areas falls into five groupings: medical command, control, communications, computers, and intelligence (MEDC4I), casualty care, medical evacuation and medical regulating, casualty prevention and medical logistics.[25]

Medical Support in the Vietnam War

At the end of the Vietnam War in 1975, US forces tallied a total of 58,209 deaths and 153,303 wounded.[26] To most, the statistics of casualties and injuries sustained by the United States in the Vietnam War was shocking. As a result, much greater emphasis was placed on the provision of medical care during the conflict. This, in turn, ultimately led to revolutionary changes in how the US AMEDD would provide medical care on the battlefield.[27]

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[23] FM 4-02, 3-1.
[24] Ibid., 5-1.
[25] Ibid., 3-1.
[26] The deaths include the period November 1, 1955 (commencement date for the Military Assistance Advisory Group) through May 15, 1975 (date last American service member left Southeast Asia); wounds not mortal exclude 150,332 persons not requiring hospital care. The update of casualty records occurred annually, including the related deaths due to combat in the Vietnam Conflict. U.S. Department of Defense. *Principles of War in Which the United States Participated*. Retrieved October 8, 2004 from DOD Web site: http://web1.whs.osd.mil/mmid/casualty/WCPRINCIPAL.pdf
[27] Fishel's book, *The Vietnam War & the American Medical Effort,* published in February 7, 1999, focused on an interview with Dr. Steven Phillips former US Army doctor in the Vietnam War. Retrieved 31 August 2004 from http://www.doingoralhistory.org/virtual_archive/1999/papers/PDF/b_fishel.pdf, 8.

The medical support plan in the Vietnam War was a simple but effective concept of medical support. The plan consisted of providing a medical unit and medical evacuation (MEDEVAC) helicopter to each combat battalion. Each unit received medical assets based on mission requirements and asset availability. Near engagement areas, units would establish medical clearings and thus bring their wounded soldiers by MEDEVAC to these areas. Once the unit cleared their casualties, a higher echelon MEDEVAC would transport soldiers to a *"field"* or *"evacuation"* hospital. This higher echelon MEDEVAC would be what we call today *General Support (GS).* They also supported the division or corps rear areas and acted as a link from forward combat units to rear area medical treatment facilities (MTFs). Once a patient received care at the field hospitals, the patient either received rehabilitation treatment or sent to a higher level of care.[28] A keynote in this process was that the lines of evacuation where extremely long between a medical unit and medical facilities with surgical capability. In fact, when there were excessive time and distance factors, the forward medical clearing company would normally receive a surgical capability to augment their care. This concept was beneficial in providing resuscitative surgical care to casualties that would have otherwise died of their wounds.[29]

The most important medical lesson from Vietnam was having the assets that allowed for quick and effective medical support. Most considered the emergency medical response system revolutionary for its time. Donald Sebesta, a Vietnam medical surgeon, believed that this was also the result of *"tri-service care effort."* Tri-service care consisted of the idea that all medical care from all military services acted as one force. When the US Air Force combined with the medical effort, the MEDEVAC became an invaluable resource. Of note was that the MEDEVAC helicopter helped to reduce the mortality rate in the Vietnam War to 2.3% when compared to the rates of WWII of 4.5% and in the Korean War of 2.5%.[30] Some even state that the MEDEVAC of patients was faster on the battlefields of Vietnam than in

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[28] Donald Sebesta. "Experience as the Chief of Surgery at the 67th Evacuation Hospital, Republic of Vietnam 1968 to 1969." *Military Medicine* 1990: 228.

[29] Headquarters, Department of the Army. *Operations Report Lessons Learned 2-68: Medical Lessons Learned.* Washington, D.C., 1968, 23.

[30] Richard D. Chapman. "A Surgeon's Experience in Vietnam." *Minnesota Medicine,* January 1970: 94.

metropolitan areas back in the United States.[31] The tactical and strategic aero medical evacuation support by the US Air Force was also magnificent and contributed in large measure to the effectiveness of the US Army medical operations. General Neel states that there was enthusiastic cross-service support among US Air Force, Navy, and Army medical facilities. He also notes that the US Navy hospital ships provided invaluable augmentation to shore-based medical facilities and the tremendous cooperation between the services.[32] Another key observation was that the wounded in Vietnam received care more rapidly than in any previous conflict. Early in the war, the US Army determined that helicopters would have an exclusive medical mission and evacuate large numbers of patients to centrally located medical facilities. Regardless of the criteria used- mortality rates, return-to-duty rates, length of hospital stay - the Vietnam medical experience was the most favorable experience of its time. The most significant variable was that the helicopter contributed to survivability by delivering to hospitals a greater numbers of casualties than in any war to date.[33]

The US Army and Air Force aero medical evacuation and medical regulating capabilities greatly enhanced the efficiency of hospitalization in that both the USA/USAF MEDEVACs were effective in moving casualties swiftly and comfortably to other supporting hospitals. The ability to regulate was an important tool in the overall medical management of patients. The contributing factor was that MEDEVACs aircraft possessed a radio system, which allowed them to work with the medical regulators. With this system in place, the medical regulators were able to direct MEDEVACs to the appropriate level of care and capability, which permitted a more efficient and economical use of medical resources.[34]

Neel also noted that the theater patient evacuation policy for Vietnam was a 15-day minimum or a 30-day optimum. The out-of-country evacuation was normally by aircraft to Clark Air Force Base located in the Philippines, from there evacuees were subsequently routed to either Tripler General Hospital in

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[31] Fishel, 10-11.

[32] Spurgeon Neel. Vietnam Studies: Medical Support of the U.S. Army in Vietnam, 1965-1970. Washington, D.C., 1991, 174-175.

[33] Ibid, 172-173.

[34] Headquarters, Department of the Army. Operations Report Lessons Learned, Headquarters, 44th Medical Brigade 1968. Washington, D.C., 1968, 4.

Hawaii, the U.S. Army Hospital in the Ryukyu Islands, or to Japan. However, in 1966, this changed to a direct evacuation by means of jet aircraft from Vietnam to the CONUS and required only one stopover in Japan.[35]

Vietnam lessons also noted that the MTFs, which normally provided long-term care to patients in the COMMZ, were not present. Neel states that "If all the injured or sick who could not be returned to duty in Vietnam within the established 15- to 30-day evacuation policy had been evacuated to the CONUS, it would have created a great drain of experienced manpower from the combat zone. To provide this fixed-bed capability, the equivalent of about 3½ general hospitals would need to establish in Japan in order to receive and care for patients who could be expected to return to duty within 60 days."[36]

However, the flexibility and versatility of the MEDEVAC under medical regulation permitted the full utilization of all the hospitals supporting the conflict. Fewer hospitals and professional personnel were required to support a given operation because of the efficient use of the medical capabilities available.[37] More significantly, a larger percentage of MEDEVACed patients received more timely and appropriate treatment of their wounds. [38]

Medical supply for the US Army in Vietnam was superb, considering the many other problems and impediments encountered. Neel highlighted that the medical supply system during Vietnam War was a key part of the over-all medical support system. It was of his opinion that the medical supply system should remain under the control of the health service system and not under the control of the US Army Logisticians. In addition to the existence of an unsatisfactory medical materiel management system in 1965-66, certain medical supply problems were believed by Neel to be iatrogenic. Neel also confirmed that medical supply was never a constraint to medical capabilities planning and that normally the medical supply always responded in a commendable manner.[39]

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[35] Neel, 70.
[36] Ibid, 70-71.
[37] Ibid, 174-175.
[38] The 44th Medical Brigade 1968, 4.
[39] Neel, 175-176.

Another key lesson was the inundation of hospitals in Vietnam War from outpatients. This was due to the physicians in divisional medical units requiring specialized consultation from higher MTFs. The significance is that this issue led to a transformation in modern medical education and created a vision of a new modular combat support hospital, which would replace the surgical and evacuation hospitals, and handle any outpatient requirements. Another significant note was the inundation also led to the positioning of certain specialists within the division to offset the outpatient requirements.[40]

Operation JUST CAUSE: US Medical Lessons Learned in Panama

There were several key medical lessons from Operation JUST CAUSE (OJC), including the first use of the combat lifesaver (CLS). Developed in the 1980s, the Combat Lifesaver program trained non-medical unit personnel to provide enhanced first aid at the point of injury. The enhanced first aid procedures included, but were not limited to, initiating an intravenous infusion, administering additional nerve agent antidote, and inserting an oropharyngeal airway. Normally, there was one member for each squad, team, or crew.[41] In most cases in Operation JUST CAUSE, the combat lifesaver was on the scene providing treatment before the medic arrived. Reports reflect that the combat lifesaver was an enormous benefit and force multiplier; it often freed the medics and allowed them to focus on the more severe injuries. One division surgeon reported, "The momentum of the attack was maintained because a single [combat lifesaver] could stop and treat a casualty rather than the whole squad waiting for a medic to arrive."[42]

Another key lesson was the utilization of CONUS Level 3 MTFs. The MTFs acted as Corps Hospitals and supported the invasion from US. The medical plan also allowed for the first use of MTOE Forward Surgical Teams (FSTs) to stabilize patients for rearward evacuation to CONUS. After leaving Panama, by air, patients went immediately to Kelly Air Force Base in San Antonio and then transported

[40] Ibid., 176.
[41] FM 4-02, Glossary 3.
[42] Department of the Army, Academy of Health Sciences. (1990). Operation *JUST CAUSE Lessons Learned Report.* Retrieved September 22, 2004 from Untied States AMEDD Lesson Learned Website: 4247.

to either Brook Army Medical Center (BAMC) or USAF Willford Hall Medical Center (WHMC). In fact, lessons from this operation often argue the significance of having a medical center (MEDCEN) provide medical support in a contingency operation. Others argue that it freed the Pre-Deployment Professional Filler System (PROFIS) fillers, who were normally fillers for the tactical units in the invasion, to provide medical care from the MEDDACs. The key in this lesson was the overall ability to provide forward surgical care with rapid evacuation to a Level 3 MTFs, either CONUS or OCONUS, rather than moving large medical units or pools of PROFIS personnel to fill TOE units within theater.[43] In fact, US Air Force Aeromedical Evacuation (AE) evacuated 257 patients from a theater of operation to military hospitals in San Antonio, Texas. Four of the nine missions (which evacuated 192 casualties) took place during the extremely intense first 24 hours of the operation. The overall survivability rate for American service members treated at the Joint Casualty Collection Point (JCCP) during the operation was 99.3 percent (276 total casualties treated; only two died from their wounds). Furthermore, no deaths occurred during AE missions.[44]

Reports reflect that most physicians in JUST CAUSE attributed the patient high survival rate, in part, to the emphasis on early volume resuscitation. In fact, Physicians at the JCCP stated, "That most wounded had been volume resuscitated before their arrival at the JCCP and, as a result, could be immediately taken into surgery."[45] Because of this, the operation revealed the importance of far forward care and the value of combat lifesavers in all units. In addition, it revealed the value of having each soldier carry IV fluid and making IV packs a part of the basic load for all combat units.[46] It also reflected the significance of providing far forward care, thus decreasing mortality rates and giving the wounded soldier an increased chance of survival once injured on the battlefield.

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[43] Ibid., 4244. Another keynote was the theater evacuation policy was zero days, OJC.

[44] Brigade General Green notes that of the nine (9) AE missions, eight (8) where by C-141 and one (1) was by C-130. Brigade General Charles B. Green. "Challenges of Aeromedical Evacuation in the Post-Cold-War Era." *Aerospace Power Journal,* Winter 2001.

[45] Ibid., 4243.

[46] Ibid., 4243.

Operation JUST CAUSE also highlighted the value of conducting rehearsals and exercises before an invasion and that rehearsals added tremendous value in medically supporting the operation.[47] Several coordination meetings before the invasion included all key Joint HSS players. During these meetings, all key personnel were *"read-on"* to the concept of medical operations and critical times. In fact, the JCCP conducted a rehearsal for all personnel, in the dark, the evening before the invasion. This meeting and rehearsal, along with a joint practice exercise held in Florida the previous week, proved extremely beneficial.[48]

Nonetheless, the AMEDD revealed some weaknesses that needed improvement. There was a consistent problem with communications and medical regulation.[49] Reports also reflected a need to restructure the FST so that it could properly support operations within theater.[50] There were complications in ground evacuation assets and no early involvement of Medical Logistics planning.[51] Additionally, medical planners had no credible plan to transition to Humanitarian Aid (HA).[52] Nevertheless, OJC was a tremendous success medically; a well-rehearsed and synchronized joint medical

[47] Ibid., 4250.

[48] Ibid., Operation Just Cause (OJC)Overview.

[49] Lessons revealed that communications between all levels of command (US Army and Joint) were inadequate due to terrain, distances and non-standard communications equipment; SATCOM was the recommendation to fix the issue, OJC 4241. Lessons state that the medical regulating system needed tailoring to the low intensity battlefield, OJC 4130.

[50] The FST received augmentation from physicians and equipment that was not part of their original MTOE. They were also employed as independent entity not in accordance with doctrine; however, the FSTs were the highest level of medical care in-theater. Studies from OJC confirm that the FST was successful and even though there was no Level 3 MTFs in theater they were still able to support the force and evacuate patients to CONUS, OJC 4245.

[51] Tactical units had inadequate understanding of non-standard evacuation (CASEVAC), thus a lack of assets to support the forces, OJC 4240. Armored MEDEVAC vehicles were inadequate when operating in an urban environment, must consider increase in time distance factors, OJC 4176; inadequate level of onhand medical supplies; no integration of medical logistics planners into the initial planning stages due to OPSEC restrictions. Thus, OPLAN directed that Corps, and not the division doctrinal approach, provide medical supplies, OJC 4238 and OJC 2664.

[52] Lessons from OJC highlight an lack of understanding in planning support for full spectrum environment; thus, inadequate planning and providing of humanitarian assistance (HA). No forethought in developing contingencies to meet the possible requirement. Lessons also revealed that palletized HA medical supplies should be developed and ready when needed, OJC 4239 and OJC 4211.

plan and operation, which paid tremendous benefits in providing medical support to US forces in Operation JUST CAUSE.[53]

Operation DESERT STORM: US Medical Lessons Learned in Iraq

Operation DESERT STORM (ODS) revealed numerous deficiencies in the deployability, tactical mobility and sustainability of hospital units. In the early 1980's, DOD directed the services to develop the Deployable Medical Systems (DEPMEDS) at an attempt to establish commonality amongst services. The intent was to develop a contingency military treatment facility capable of being located in a desired or required area of operation during a contingency, war, or national emergency; in addition, the facilities would be able to provide medical care capabilities to meet the requirements of Level 2, 3, and 4.[54]

The prefabricated, containerized modules housed pharmacy, X-ray, laboratory and operating rooms, which could be configured according to the medical needs of the unit.[55] However, in ODS the DEPMEDS was unable to be rapidly deployed and was dependent upon Corps transportation assets for mobility. Thus, the hospitals were unable to keep pace with the US forces on the battlefield.[56] There were also other deficiencies such as the lack of MHE and storage and distribution capability for fuel and water. The MTFs also possessed inadequate communications equipment for emergency medical consultation, command and control and patient evacuation. Nevertheless, coalition forces were able to field an impressive collection of medical facilities and field hospitals. In fact, the British, Italians and French had excellent field medical facilities, which could rapidly deploy in support of any joint military or refugee operation.[57]

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[53] Ibid., Operation Just Cause Overview.

[54] Department of Defense. *DOD Instructions: DOD Medical Standardization Board*. Number 6430.2. Washington, DC: March 17, 1997, 1-9.

[55] *Army Medical Specialist Corps Deployment Readiness Handbook.* (1999). Retrieved October 24, 2004 from Google Web Site: www.armymars.net/ArmyMARS/EmergencyOps/Resources/army-med-deploy-readiness-hdbk.pdf

[56] Operation Desert Storm Medical Lessons Learned 3866. Retrieved September 7, 2004, from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/library/showsub.asp?CatID =15&cat=Operational% 20Deployments

[57] Ibid., 4093.

The observations from ODS revealed a need for a Combat Support Hospital (CSH) with the capability of positioning forward a rapidly mobile Level 3 element with surgical capability.[58] The facility would allow for either palletization and/or airdrop, much like the French paramedical rescue hospital.[59] Once the medical element positioned forward it would provide forward surgical support while maintaining its 100% mobility. Studies from ODS state that the MTF would need trucks and light trailers which could facilitate its mobility and allow for the transportation of tentage that supports EMT areas, OR, ICU and/or a holding facility. When required the mobile Level 3 element would be able to displace and position its services anywhere on the battlefield based on METT-TC analysis. The facility would be able to self-sustain for limited periods until the remaining elements of the MTF arrived from the CSH or as coordinated by other means.[60] The remaining assets of the CSH would consist of follow on elements, which could echelon and reinforce any surgical and hospitalization requirements based off the mission.[61]

One of the most consistent and critical comments about medical support during ODS was the inability of the maneuver unit chain of command to obtain current information on the location and condition of their soldiers. In most circumstances the medical regulation system did not work. Sentiments expressed in ODS reports was that "Medical units would have been better served if [Medical Regulating Officer] MRO was sent home."[62] Most of the lessons during ODS were due to inadequate communications and the inability of MROs to obtain information.[63] However, some reports revealed that the MROs were unable to perform their jobs due to a lack of training and education.[64]

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[58] Ibid., 3640.
[59] Ibid., 4090.
[60] Ibid., 3263.
[61] Ibid., 4090.
[62] Ibid., 3632.
[63] MRO automation system [TAMMIS] and the personnel database [SIDPERS] did not interface and limited the ability of personnel liaison officers to provide information, ODS 4348. Inadequate communications between hospitals to include the Joint Medical Regulating Officer (JMRO) also resulted in variation of policies between US Army and US Air Force. Reports indicate a vast need for improvement in the communications equipment, ODS 3351.
[64] Ibid., 3601.

Reports from ODS also reflected numerous deficiencies and inabilities in medical units providing command and control in its operations, a lack of unity of effort and inadequate training and readiness.[65] However, of the most critical of these issues was the lack of unity of effort in leading medical units. Reports from Desert Storm revealed considerable bickering among Medical Corps and Medical Service Corps leaders over of who should be the overall commander of a medical unit. The policy at the time was that during peacetime, a Medical Service Corps officer commanded medical units. However, once at war a Medical Corps Officer (MSC) would assume command of medical units that provided direct patient care. In fact, some physician PROFIS commanders expressed no interest in commanding and leading medical units.[66] Nonetheless, due to policy during ODS physicians had no other choice. Reports also state that medical units led by MSCs failed to consult with physicians on medical matters. Consequently, critical decisions occurred without physician input, i.e., decisions concerning blood transportation, stockage and use; medical supply system policies; incubated patient transport and the transport of nerve agent patients. An actual AAR reflected that the 44th Medical Brigade Commander held the belief that he did not intend to consult nor receive advice on medical matters from physicians assigned to his headquarters. [67]

Another significant issue was the overall lack of training and readiness of active duty and reserve personnel. Training before ODS often depicted inadequate integration and training of PROFIS personnel. There was often no focus in TOE units on providing medical care in a training environment and inadequate sustainment training.[68] Reports also depict PROFIS personnel as being deficient in common task skills and field craft, while the TOE personnel often reflected poor clinical skills to include a lack of

[65] The lessons from ODS depicted several MTOE issues. Hospital MTOEs at the time authorized only 50% of authorized personnel a personal weapon reference ODS 4030; MHE and power generation equipment not sufficient to support their MTFs, ODS 2696 and 3868; navigation and avionics equipment on MEDEVAC aircraft was not adequate nor were aircraft maintenance capabilities, ODS 3709. Lessons indicate insufficient transportation authorized for mobility, lack of secure communications and no shelter for bulk storage, ODS 3409, 4315, and 4330.

[66] Ibid., 4351.

[67] Ibid., 3201.

[68] ODS Medical Lesson Learned # 4039 and United States General Accounting Office. *Operation Desert* Storm, Full Army Medical Capability Not Achieved. Washington, DC: February 1992, 4-5.

training in the low density medical MOSs.[69] The Medical Force 2000 (MF2K) air ambulance company of UH-60s proved to be an excellent organization, requiring only minor changes; however, there were other trends to note within the area of evacuation.[70] There was inadequate service integration; coordination of USAF evacuation aircraft and often the USAF lacked the staff to support military operations.[71] Standard and non-standard evacuation vehicles could not keep pace with US armored vehicles and were often maintenance intensive. There was also an inability to communicate with maneuver elements.

Medical planning was also a serious issue. Reports indicate a lack of casualty estimates provided at the command levels led to the difficulty in projecting health care delivery requirements throughout the entire health care continuum. The planning estimates did not include support for EPWs, displaced civilians or refugee support. Thus, the lack of casualty estimates made projecting health care requirements difficult.[72] Medical support to *"refugee"* camps was normally de facto or established by United Nations High Commission for Refugees (UNHCR).[73] Overall, there was also a lack of policy for humanitarian care. Even though US Army medical units received the mission of providing medical care to displaced civilians in Iraq, it lacked the resources, personnel, and supplies to support the mission.[74] Medical units also consistently complained about security and in fact were often unable to provide their own perimeter security. Nonetheless, medical units were able to use a base cluster concept for security, which added to the overall protection of medical units.[75]

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[69] ODS Medical Lesson Learned # 3803 and *Full Army Medical Capability Not Achieved*, 2-5.

[70] The long lines of evacuation often exceeded the capabilities of aeromedical evacuation aircraft and complicated communications efforts between the supporting and supported units. No overall, command and control, AVIM support, and A2C2 to include the positioning of the aircraft to effectively clear the battlefield, ODS 2841 and 4348.

[71] USAF aircraft were to evacuate patients from forward collecting points to the corps rear; did not occur, due to inadequate planning and inter-service cooperation; reflected a need to update the intra-theatre evacuation system. USAF C-141s were not able to evacuate seriously ill patients, did not have proper equipment for care, ODS 3347.

[72] Ibid., 3700.

[73] Ibid., 3141.

[74] Ibid., 3751.

[75] Ibid., 4330.

As directed by the Department of Defense (DOD), the US Army assumed the mission as the Single Integrated Medical Logistics Manager (SIMLM) for theater Class VIII operations.[76] This meant that the US Army was responsible for the medical resupply of all service components within a Combatant Commander's (COCOMs) Area of Operation (AOR); a responsibility which created unanticipated problems for the US AMEDD. One of the problems was internal and caused by the US Army ordering medical supplies not normally on the formally. Other contributing factors were units often deployed without their authorized stockage lists (ASLs) of Class VIII[77], there was inadequate pediatric sets to support the Humanitarian Assistance (HA) missions[78] and an overall inability to stock, store, and distribute Class VIII.[79] Commonly, unit ordering did not follow the established UAs and thus ordered unauthorized equipment.[80] Transportation for the resupply of Class VIII was also a difficulty. Medical Logistic units were often unable to acquire Corps assets to facilitate the transportation of the required supplies. There was also a lack of medical planning and prioritization of medical units, which contributed to resupply at the COCOM level. As a result, medical units were often lost in the deployment to ODS.[81]

On a positive note, reports indicated that the medical specialties were very beneficial in their use during ODS. Division dental support was excellent in the theater because of their positioning at the Main

[76] The US Army, IAW US Code, Title 10, has the responsibility of supporting other services in class VIII and blood supply; also include Veterinary Support and patient evacuation within theater. U.S. Army Medical Materiel Center, Europe (USAMMCE) performed the mission with insufficient staffing, stock funding, or organizational structure and lead to difficulties in supply Class VIII, ODS 4066.

[77] Units did not identify Class VIII shortages before deployment and often waited until they reached their mobilization site; they often ignored their Prescribed Load List (PLL) and ASL due to a lack of confidence in the system. Units did not follow Unit Assemblages (UA) and often commanders took no action when their unit's went outside their authorized UAs. There was no standard formulary at all levels (Division, Corps), ODS 3679. Units deployed to ODS without adequate Class VIII to support their operational requirements, ODS 4104.

[78] ODS revealed the need for Pediatric Medical Equipment Sets (MESs) and that they are critical in future HA operations, also the need for specialized push packages by country/region, ODS 4103 & 3930.

[79] The AMEDD was unable to effectively stock, store, and distribute Class VIII. Theater stockage objectives required large amounts of on-hand medical materiel resulting in storage and theater movement problems for both MEDSOMs and MTFs. MEDSOMs had inadequate organic transportation assets to deliver supplies forward and were unable to acquire limited theater transportation assets, ODS 3704.

[80] Poor command emphasis in following the Command Discipline Supply Program (CDSP), ODS 3679.

[81] Transportation of Class VIII was inadequate, difficulty in assigning unit line numbers (ULN) to non-unit cargo shipments due to a lack of understanding by AMEDDC logisticians of the Joint Operation Planning and Execution System (JOPES) and no changes of DODAACS resulting in a loss of visibility during transportation, ODS 3680.

Support Medical Company and the Forward Support Company's. Reports also reveal that dentists were adequately prepared to function in mass casualty situations (possibly performing triage), and patient trauma situations. This also helped to pay great dividends in providing treatment to casualties.[82] Preventive medicine and veterinary service assets were also extremely successful. However, there was discussion about their employment within divisional units. Recommendations were to assign PVNTMED personnel to division surgeons. Another recommendation was that PVNTMED assets must position their assets at port/staging facilities before the arrival of significant numbers of troops. This is to ensure site survives and assessments of potential operating sites.[83] In addition, the positioning of Mental Health (MH) units should be near MTFs in order to provide effective treatment to patients.[84] In fact, these recommendations would be implemented within the force and pay great dividends in our future operations.

Operation UPHOLD DEMOCRACY: US Army Medical Lessons Learned in Haiti

One of the greatest strengths of the medical support of Operation UPHOLD DEMOCRACY (OUD) was the early integration of medical planners. Medical reports indicate an excellent integration of all service components to include numerous agencies that led to a well-synchronized medical plan.[85] Another highlight was that the CJTF/MNF Surgeon Staff used lessons learned from Somalia to help in mission analysis and in the designing of the JTF Surgeons Office. The JTF Surgeon also established links through his office to validate Civil Affairs (CA) medical missions. This link allowed the TF Surgeon to

[82] Ibid., 3144.

[83] Poor use of PVTMED in theater, ODS 2789. Inspections and sanitation at port facilities and large troop concentration appeared to be nonexistent or poorly organized and controlled; poor use of sanitation measures, contributed to the spread of Shigellosis; as a result there was a generation of over a thousand cases, ODS 2940.

[84] Mental Health (MH) units not located near MTFs; ODS recommendations to co-locate the MH facility/unit with or in close proximity to the vicinity of the MTF, ODS 3603 and 3766.

[85] Proper coordination of USAF aeromedical evacuation to include patient regulation; JSOTF HSS, cross service utilization of Level 3 hospitalization, effective HSS C2 for the overall operation, the successful use of a Forward Surgical Team; and inserting command elements on a preplanned USAF C130 MEDEVAC aircraft, HQs, Multinational Force Haiti (MNF), Joint Task Force Surgeon Office. *Multinational Force -Haiti Surgeon's Narrative Executive Summary*, published March 26, 1995, 1. Retrieved September 20, 2004, from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/Reports/OperationUpholdDemocracy/MNTFSurgeon AAR.htm

check each mission for soundness, maintain some control of medical assets, and keep the commander informed of all medical activities including those that are CA/Civil Military Operations (CMO) in nature.[86]

Some of the additional lessons learned by the staff were the need to understand the other services medical capabilities such as US Navy medical facilities and their requirements for US Army MEDEVAC to have deck qualification before landing on US Navy ships.[87] The US Army was unable to deploy critical medical assets early in the operation due to difficulties in the Time Phased Force Deployment Data (TPFDD). Thus, the US Army had to rely on the USNS Comfort to cover critical healthcare for the land forces. Overall, the presence of the Comfort contributed strongly to the overall capabilities of the operation. They were able to support US Army medical shortfalls, such as PM support and assessments for units ashore to include medical repair and resupply as needed, which gave the tactical commanders more flexibility.[88]

Medical regulating was still a consistent problem carried over from ODS. The Theater Army Medical Management and Information System (TAMMIS) continued to have problems in that in did not work through TTA or over the MSE network. The system did not work through standard US Army phone lines and often presented problems when communicating through INMARSAT. In fact, the subject matter experts on the ground were unable to manipulate the system and communicate over the standard US Army communications and information systems. However, the TAMMIS system finally became operational once a class A line was acquired.[89]

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[86] Division Surgeon's office became the model in building the JTF cell. The section used the standard staff planning process to develop the specified and implied tasks and identified the augmentation needs for the office, US Army Center for Health Promotion & Preventive Medicine (USACHPPM), *Operation Uphold Democracy Lesson Learned*, published November 5, 2002. Retrieved September 20, 2004, from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/library/showlink.asp?CatID=277&parentID= 15&subname= Operation+ Uphold+ Democracy+%28Haiti+23+Jan+%2D+31+Mar+95%29&parentname=Operational+Deployments

[87] Ibid.

[88] Ibid.

[89] TAMMIS did not become operational until the seventh day of the operation. Unfortunately, there was no need during this time to regulate patients, but would have greatly effected the MROs ability to regulate, ibid.

Operation UPHOLD DEMOCRACY also saw the first implementation of Telemedicine (TELEMED). The intent of TELEMED was to use the internet and video-conferencing equipment to allow a doctor in one location diagnoses a patient in a different city, or even a different part of the world. The system also possessed the capability for enhanced medical training and education of healthcare practitioners by allowing one to watch a certain procedure such as an operation-taking place elsewhere. More importantly, the system could potentially help reduce the overall medical footprint needed within theater to support military operations, and because of consultation, still bring state of the art care to a theater of operations. However, TELEMED representatives from Tripler Army Medical Center (TAMC) had to deploy to establish a televideo link between the outlying medical companies and the 47th Field Hospital (FH); and due to the lack of an available communications links, the video connection did not occur until the last weeks of the MNF's redeployment.[90] Eventually, there was a link established between TAMC computer/data base system and the MNF Surgeon. The system called Composite Health Care System (CHCS) also helped the MNF surgeon and other physicians within Haiti to provide comprehensive medical care to forces within theater. CHCS also allowed access to patients' medical databases enabling a more focused and effective medical treatment within theater.[91] The medical lessons from Operation UPHOLD DEMOCRACY also depicted an insufficient supply of pharmaceuticals for the operation. In fact, that operational readiness endangered the mission due to the inadequacy of obtaining timely pharmaceutical supplies through medical supply channels.[92]

Preventive medicine and veterinary operations during Operation UPHOLD DEMOCRACY were also critical to the unit's success. They often conducted frequent inspections of dining facilities, latrines,

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[90] HOTS system provided a method that would allow a linkage between the MTFs within theater, HQs, MNF, and Joint Task Force Surgeon. *Multinational Force -Haiti Surgeon's Narrative Executive Summary*, 6.

[91] The link between TAMC and MNF Surgeon was by a Mobile Gateway Van connection and enabled the MNF Surgeon to link his computer to Tripler's database through INTERNET protocol, ibid 6.

[92] Reports note that even the co-located MTFs were either unwilling or unable to assist in supplementing the efforts of TOE medical supply elements. Some recommended that there should have been preposition medications for deployment in the medical supply section of a CSH or the deployment of a Medical Logistics Battalion, US Army Center for Health Promotion & Preventive Medicine (USACHPPM), *Operation Uphold Democracy Lesson Learned*, 2002.

and were vigilant in ensuring that area diseases were contained. Because of a proactive inspection program of dining facilities and food preparations, there were no documented episodes of food borne illness from DFACs. The MNF Veterinarian played a vital role in controlling illnesses associated with food and by coordinating with other veterinarian assets in theater to inspect local sources of meats and water from the Haitian economy.[93] Overall, both specialties were highly effective and maintained the health of the command because of their daily inspections. Their contribution to the operation was also a direct result of the very low DNBI rates of US forces.

Peacekeeping in the Balkans: US Army Medical Lessons Learned

Instability within the Balkans, found the US Army deployed to another complex environment, conducting peace enforcement operations. A key lesson from the Balkans was that communications were paramount when conducting medical operations. This not only included communication systems but also automation systems, which allowed for a seamless command and control of subordinate medicals units.[94] Medical units in these types of operations often find themselves in split base operations and must possess the capabilities to perform their medical mission. TELEMED units were also in use within the theater.[95] However, during the early stages of the operations data transmission were limited to 64 kilobytes per second (kbs) and thus made it impossible to send the clear real-time images required to conduct an effective VTC medical consultation. The first assessment on the system was that it was a great concept,

[93] MNF Veterinarian became involved with the Haitian Ministry of Agriculture; provided technical advice to the Ministries of Agriculture and of Health in planning a national vaccination campaign to prevent rabies in dogs and assisted the Pan American Health Organization with its Emergency Anthrax vaccination campaign, HQs, Multinational Force Haiti (MNF), Joint Surgeon Office. *MNF-Haiti Veterinary After Action Review, Operation Uphold Democracy in Haiti*, published March 31, 1995. Retrieved September 20, 2004, from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil /Reports/OperationUpholdDemocracy/MNTFSurgeonAAR.htm.

[94] Initial medical operations in Bosnia consisted of a split-based operation with headquarters in Taszar, Hungary and a forward element located near Tuzla, Bosnia; issues emerged with connectivity and synchronization of subordinate units. Communications planning and C2 units need redundant communications and ADP for split base operations, US AMEDD. *Observations - Operation Joint Endeavor (OJE): Lessons Learned from the 1st MED Group*, 1. Retrieved October 29, 2004 from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/Reports/issues/issues.htm

[95] The TELEMED was to provide real-time medical consultation to the AOR from worldwide MTFs (included basecamp aid stations and remote outposts where medical NCOs was providing care), *Multinational Division-North and 1st Infantry Division (FWD), Operation Joint Guard After Action Review*. Tuzla, Bosnia-Herzegovina, October 1997, paragraph 6, Issue 5: Primetime III/Telemedicine.

but inadequate equipment. The system was not durable under the given conditions and displayed numerous technical and mechanical problems with its hardware and software. Additionally, with the influx of automation equipment required additional operators and maintenance techs to fix the system.[96]

Lessons from the Balkans revealed that medical units often fail to understand the level of uncertainty in dealing with Stability Operations and Support Operations (SOSO) missions. Reports highlighted a lack understanding in dealing with complex operations within their respective AORs and in providing simultaneous medical support in a full spectrum environment (e.g. Civil Affairs/PSYOPS, Special Operations, Combat Health Support to maneuver units, Humanitarian Operations). Lessons also revealed that there are usually requirements for the execution of robust Medical Civic-Action Programs (MEDCAP).[97] In addition, reports indicated medical HQs often lacks in experience and proficiency when planning medical operations to include monitoring of on going operations. There was also a lack of medical intelligence, its use in understanding host nation medical facilities and in establishing policy and procedures within theater, which ultimately govern the use of those facilities to include the establishment of the Medical Rules of Engagement (ROE).[98] Another key lesson was that echelons above division are often not in the flow of information between the Corps and Division assets.[99]

Several readiness issues affected units deploying the Balkans such as PROFIS fillers, training readiness and National Guard (NG) readiness. Lessons revealed that the PROFIS continues to have systemic problems and as a result influences a medical unit's overall readiness for deployment.[100] There

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[96] Ibid.

[97] *The Task Force Med Falcon 1B After Action Review (Deputy Surgeon).* May 2000, paragraph 4. Retrieved 22 September 2004 from US AMEDD Lessons Learned web site: https://secure-ll.amedd.army.mil/Current/kosovo/ 1BTaskforce_Med_Falcen.html

[98] There was no established Medical ROE once TF MED Falcon deployed to OJE only guidelines from a V Corps Medical Eligibility Matrix. A vast majority of treatment of LN (Local National) emergency patients occurred at US MTFs; even though V Corps Medical Eligibility Matrix stated that LNs were only authorized emergency medical treatment and evacuation, *Task Force Med Falcon 1B After Action Review*, paragraph 1.

[99] The Multinational Division-North and 1st Infantry Division (FWD), Operation Joint Guard After Action Review, paragraph 2, Issue 1; and 61st Area Support Medical Battalion After Action Review for Bosnia Deployment (SFOR4), Operation Joint Forge. Fort Hood, TX, December 31, 1998, 9.

[100] Reviews indicated poor management of the PROFIS system, which hampers the training, notification, and deployment of PROFIS personnel. There are constant changes of fillers; a recommendation was to reengineer the system so that *"clinical filler"* assignment is to the supported unit, with duties at designated MEDDAC and

is often a lack of integration of attached units to the medical command and control headquarters. The attached unit normally arrived a few days before deployment and created readiness issues for the command and control headquarters. Additionally, most of the NG soldiers continued to maintain a high rate of non-deployment due to medical readiness. In fact, reports indicated a need for early notifications of NG units to achieve operational readiness; it also supports the opinion that when medical units arrive in theater, they must be ready to provide medical support not only to US forces but also to multinational forces based off the every changing environment.[101]

In the realm of medical logistics, medical units highlighted the need to establish logistical and medical maintenance support before deployment and to establish re-supply contingencies before asset depletion. However, AARs indicated that medical units do not receive adequate intelligence estimates before they deploy and thus create supply and equipment deficiencies once in theater.[102]

In terms of hospitalization, the CSH still lacks mobility and has numerous challenges in establishing its initial operations. Reports also depicted that often their TOE equipment receives poor maintenance to include a lack of accountability in its overall items.[103] Units also revealed that they normally deployed with inadequate numbers of personnel to staff operating rooms (ORs) and their central material service (CMS) section.[104]

Another significant issue faced in the Balkans was the inability to provide theater Patient Tracking. While the US Army possessed an extensive patient evacuation and medical regulating system

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MEDCENS, *MND-North and 1st ID (FWD), Operation Joint Guard AAR*, paragraph 7, Issue 6; and 61st *ASMB AAR for Bosnia Deployment (SFOR4), Operation Joint Forge*, 6 and 18.

[101] 61st *ASMB AAR for Bosnia Deployment (SFOR4), Operation Joint Forge*, 20. US Medical Company (AA) provided MEDEVAC support for SFOR (Joint and Multinational Forces) units.

[102] Coordinate with supporting MEDLOG Battalion to discuss SOPs for maintenance support, *MND-North and 1st ID (FWD), Operation Joint Guard AAR*, paragraph 14. No defined mission in advance of deployment creates treatment issues once in theater, U.S. Department of The Army. *The 67th CSH AAR: The Task Force Med Falcon 1A After Action Review*. Wuerzburg, Germany: May 16, 2000.

[103] Medical units locally purchased equipment to facilitate 110/220 voltage; deficiencies identified once deployed and TO&E does not reflect trauma care standards within theater, *67th CSH AAR: The Task Force Med Falcon 1A After Action Review*.

[104] Recommendations were to match or have Active units "sponsor" a Reserve Component medical whenever possible, coordinate training efforts during Annual Training, *Multinational Division-North and 1st Infantry Division (FWD), Operation Joint Guard After Action Review*.

(IAW FM 8-10-6, FM 8-55 and ARs 40-535), medical personnel continued to have trouble in providing field commanders follow-up information on the status of their soldiers once they leave an AOR.[105]

Colonel Newcomb also noted that in the initial stages of IFOR countries supporting the United Nations (UN) often refused to repatriate their injured soldiers. Their refusal related to the issue that most soldiers were from third word countries; countries that lacked the proper health care to treat an injured soldier. The reality was that their hospital inpatient stays normally exceeded the UN mandated 30-day evacuation policy. The key lesson from this is that when working in a multinational operation, US MTFs must anticipate the potential of hospital stays exceeding the stated evacuation policy and an associated increase in the complexity of care.[106]

US AMEDD Lessons Learned in the Support of Disaster Relief Operations

In the 1990s, two of the worst hurricanes in our continent's history struck the North American continent. The names of the two environmental disasters were Hurricane Andrew and Hurricane Mitch. Hurricane Andrew hit South Dade County, Florida on the morning of 24 August 1992, was the "worst natural disaster ever to hit the United States..."' [107], while Hurricane Mitch, October 26 into early October 27, 1998, grew to become the Atlantic basin's fourth strongest hurricane to ever come to shore.

In terms of medical support, both operations revealed numerous Medical C4I issues when supporting either Disaster Support Operations (DSO) or Foreign Humanitarian Assistance (FHA).[108] After Action Reports revealed the necessity for an overall entity to command and control medical operations and that government, to include non-government agencies, would look to DOD resources to

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[105] USAF and Army units were highly successful in evacuating patients out of a theater of operations, due to collocating USAF AELT with CSH tactical operations center, ibid.

[106] Colonel Everett W. Newcomb, III. *United States Military Health Care Operations in Multinational Missions.* The Industrial College of the Armed Forces National Defense University. Washington, DC: 1995, 16.

[107] Carroll, AAR Article.

[108] DSO/FHA operations had neither established training doctrine nor operational doctrine in disaster assistance operations, Colonel Dale A. Carroll, *The Role of the U.S. Army Medical Department in Domestic Disaster Operations: Lessons Learned from Hurricane Andrew*. Carlisle Barracks: U.S. Army War College, PA: 1996. 14. The TRADOC executive summary highlighted the need for doctrine that facilitates the coordination and implantation of all interagency coordination and operational procedures; this contributed to a delay in providing relief support, *Executive Summary of TRADOC to JTF Andrew*, September 10, 2002, paragraph 3, sub para a.

overcome potential logistical and medical concerns.[109] Reports from these operations also highlighted that medical units continued to struggle with their inability to communicate with elements operating in the force, an issue that continually related to ineffective communication and automation systems.[110] There was also tremendous value in establishing a standard Joint and Interagency medical report systems. Reports indicated that both disasters required a common system that would have enhanced the overall disease and injury surveillance efforts. It would have also simplified the documentation of the patient.[111]

Both operations also highlighted the importance of a higher commander's intent to include an established end state. This issue tended to affect the task organization to support both operations, but more importantly the long-term primary care requirements.[112] Medical planners often encountered difficulties in determining requirements versus capabilities to include the establishment of a task force that could properly organize and prioritize the public health reconstitution.[113] The task organization of Joint Task Force Assistance (JTFA) staff focused on providing Preventive Medicine (PM) to include the augmentation of subject matter experts in fields such as health facility engineering, solid waste management, water system design, veterinary medicine, public health and mental health. Planners must also ensure a link between Health and Medical Task Force (HMTF) and the Civil-Military Operations

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[109] Lessons revealed the importance of designating a Joint Surgeon for DSO. The United States Public Health Disaster Medical Assistance Teams (DMATS) deployed to Hurricane Andrew, but was not equipped nor supplied for sustained operations. The DOD resources allowed the agency to eventually overcome their problem; the element collocated with the forward headquarters of the 44th Medical Brigade, Carroll, 13.

[110] Leased cellular telephones were the primary means of communication until the FEMA established satellite communications systems, overall, unable to resolve the communications shortfalls, ibid. DSO/FHA mission also lack automation systems to properly command and control, Carroll 14-15 and Hurricane Mitch AAR. US AMEDD Lessons Learned, Fort Sam Houston, TX: July 9, 2002, 2. Retrieved September 15, 2004, from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/Reports/Mitch/HURRICANEMITCH1.htm

[111] During Hurricane Andrew, epidemiologists from the Centers for Disease Control and Prevention and Army epidemiologist were unable to agree upon reporting criteria; thus, they were unable to collect compatible information; still no consensus on a standard medical reporting criterion among other agencies, Carroll 15.

[112] Need for a flexible medical force structure to meet the requirements of the operation; ensure Preventive Medicine assets are employed up front and use of Environment Science Officers are effective in anticipating missions once in AO. JTF Commanders intent and endstate are crucial in building a flexible medical operation. During Hurricane Mitch, priorities shifted once elements were on the ground, Carroll 11-15 and Hurricane Mitch AAR, 2.

[113] DSO/FHA missions revealed medical excess in some capabilities, but were inadequate in other areas, result of inadequate mission analysis due to an often rush to deploy, ibid.

Center (CMOC) for coordination of interagencies. [114] Another lesson from ODS/FHA operations is there is often an inadequate flow of critical information during planning, both up and down the chain of command.[115]

Lessons in the area of treatment pertained more to rules of entitlement to include who can and cannot receive treatment in a natural disaster. There was also a concern that service regulations did not adequately protect military healthcare providers in treating civilians, in specific Civilian Relief Workers.[116] In terms of mental health, military mental health teams primarily collected data in the disaster areas and assisted the state mental health teams in providing support to the local population. Mental health support teams were able assess neighborhoods and facilitated the early intervention by State mental health assets. In terms of dental support, Hurricane Andrew saw limited military dental care for the civilian populace due to the availability of public and private dental care.[117]

In terms of Medical Logistics, a major issue in DSO/FHA operations was the inability to respond to pediatric and geriatric requirements.[118] Another concern in Hurricane Mitch was that medical units, in haste of arriving in area of operation (AO), deployed with medications that had passed their potency-dates. Another key issue dealt with the requesting, filling and transporting Class VIII. During Hurricane Mitch, units often experienced delays in the receipt of Class VIII because of the transportations backlog

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[114] The 44th Medical Brigade from Fort Bragg, NC was the supporting medical command; deployed an element, 44th Medical Brigade (FWD), called the JFTA to Hurricane Andrew. JFTA and NDMS MSU consolidated efforts and developed the Health and Medical Task Force (HMTF). The membership included representatives from DOD; Federal non-DOD; State, City, and County; health and medical organizations such as medical and dental societies; nursing, veterinary and hospital associations; other non governmental organizations (NGO) such as the American Red Cross and the Salvation Army; and private voluntary organizations (PVO). The HMTF lead to an overall unity of effort, Carroll 11-14.

[115] Staffs tend to keep information to themselves and fail to authorize direct communication between the medical planner on the ground and the units selected to perform the mission, Hurricane Mitch AAR, 1.

[116] A memorandum from the Office of the Army Surgeon General clarified the situation and applied it to all military services. The JTF Staff Judge Advocate (SJA) staffed the issue with FEMA who indicated that 42 U.S.C. 5170(b) authorized the provision of routine medical services to relief workers and disaster victims and recommended that military medical support should end when the civilian health care infrastructure is restored, *Executive Summary of TRADOC to JTF Andrew,* paragraph 3, sub par c.

[117] Carroll, 13.

[118] Army medical units arrived with basic load of standard medications. However, did not possess certain patients (pediatric and geriatrics) in the unit's pharmacies, *Executive Summary of TRADOC to JTF Andrew,* paragraph 3, sub par c.

caused by a large amount of *"aid packages"* from a variety of sources. Reports also stated that in some cases, personnel within the medical logistics system often downgraded priority requests. This affected the Joint Task Force's (JTFs) ability to provide support within theater.[119]

Preventive Medicine efforts in DSO/FHA operations are also significant. Lessons revealed the importance of PVNTMED assets arriving early in theater to conduct proper assessments. Reports also revealed their importance in addressing environmental threats to include their containment of those hazards. However, a keynote from Hurricane Andrew was that all services sent their PVNTMED assets to assist, but in their efforts, created a lack of unity of effort. The lesson is that all medical elements must either be in OPCON or TACON of the Medical Task Force or coordinate with the Medical Task Force headquarters to ensure proper utilization of efforts.[120]

As with PM assets, veterinary assets are also crucial in DSO/FHA efforts. Veterinary units often helped in quelling displaced animals due to the hurricanes and provided tremendous assistance in conducting food inspection, animal medicine and area assessment (disease threats). However, one key lesson was that government agencies were not familiar in how to request these assets and thus created a lengthy delay in obtaining their services.[121]

Operation ENDURING & IRAQI FREEDOM: US Medical Lessons Learned

Operation Enduring Freedom (OEF) and Iraqi Freedom (OIF) both reveal numerous medical lessons from the medical functional areas. However, this text will primarily focus the significant topics of

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[119] Hurricane Mitch AAR, 2-3.

[120] Initially, a PHS captain, an environmental science officer, headed the Emergency Medical Task Force (EMTF) and chaired the task force from within Dade County. Other military PM assets arrived and immediately begin efforts to support the incident. However, the efforts were not coordinated through a Preventive Medicine task force and as a result, their work often overlapped. The lesson from this is it violated the principle of unity of command and the value of assigning medical functions to a single command responsible for overseeing and planning medical efforts, Carroll 11.

[121] There was a delay in requests from Florida state authorities and private organizations. This was due to a lack of knowledge in making request for military veterinary assistance, an approval process that actually took three to five days. Lessons reveal that exact line of authority and sequence of events for civilian organizations to request military assistance must be clarified, defined and published, Carroll 9 and *Center of Army Lesson Learned (CALL) - Newsletter* 93-6: Operations Other Than War, Volume II - Disaster Assistance - Chapter 5, Fort Leavenworth, KS: December 1992.

medical C4I, treatment, hospitalization, medical logistics, and medical regulating/evacuation. Lessons from each of these functional areas revealed the need to update an antiquated communications system. Due to extended lines of communications, medical units, to include command and control elements, were unable to communicate and complicated medical and logistical efforts. OEF/OIF units also discovered the value of commercial satellite communications systems, such as the iridium phones, and the systems durability under the extreme conditions.[122]

Lessons also revealed critical issues in reference to the use of automation. Secure Internet Protocol Network (SIPRNET) was either unpredictable or nonexistent in many locations. The US AMEDD pushed to field the new MC4 system, but quickly learned that the NT software platform was not compatible with other primary network resources, and thus needed an upgrade to support WIN 2000. They also discovered that without connectivity the MC4 system was limited in its use.[123]

In terms of medical planning, OIF/OEF revealed an inadequate understanding and use of interagency coordination during complex operations to include the use of medical assets. [124] There is also need for better joint interoperability to support all phases of the operation. At times, there appeared to be a cultural divide between services, hindering medical support in the theater. However, there were some positive trends, such as the synchronization of theater medical assets to prevent redundancy within the

[122] Medical units lacked adequate communications for Level 3 MTFs, MROs/Evacuation, MED LOG and C2 elements. DNVT and FM communications were not reliable and possessed a significant shortfall in communication capabilities; units must include satellite telephones, high-frequency radios, tactical satellite radios (TACSAT), and mobile tracking systems, US AMEDD. *Observations - Operation Iraqi Freedom,* OIF 15406. Retrieved November 15, 2004 from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/deployments/Iraq.aspx, OIF 15404, OIF 15473, OIF 582, OIF 5750 and OIF 7047.

[123] MC4 is an automation system that interfaces and links to multiple points throughout a theater of operations. Austere OS/hardware environment provided challenges for MC4 systems and affected productivity, end-user acceptance, and caused the underutilization of computer resources. Medical units also needed upgrades in their systems to run Windows NT (New Technology). Once modifications occurred, the MC4 seemed to operate efficiently, OIF 5772, OIF 15071 and OIF 7142.

[124] OIF #15331. Medical intelligence shape operations and focuses training on local medical threats to include training on anticipated combat casualties; C2 elements must communicate with units in theater so that predeploying units can focus their training, such as HA and pediatric care, US AMEDD. *Observations – Operation Enduring Freedom,* OEF 5711. Retrieved November 15, 2004 from US AMEDD Lessons Learned Web site: https://secure-ll.amedd.army.mil/deployments/Afghanistan.aspx.

theater.[125] OEF/OIF also revealed the need to synchronize medical efforts with civil military operations (CMO) when planning Post-Conflict Operations and HA efforts in order to prioritize medical operations. Lessons also highlight that on a full spectrum operations battlefield; medical elements should anticipate medical requirements such as EPW/DPs support, Medical Civic-Action Programs (MEDCAPs), and hospital assessments while simultaneously providing medical support to the force.[126]

In terms of treatment, OIF/OEF highlighted the limits of conventional Combat Health Support (CHS) and the difficulty in providing Level 1 and 2 health care when forces possess extend lines of communications (LOCs). This was a constraint, which often created delays in evacuation of patients and often resulted in the death of several soldiers.[127] At an attempt to mitigate this problem, a supporting medical company would conduct split-based operations from Kandahar, with a forward element position at a Forward Operating Bases (FOBs) southeast of Bagram. This was a distance of approximately 325 miles between elements. To ensure communications, forward elements utilized TACSAT as their primary communications systems.[128]

Other concerns that emerged out of these operations were that Level 2 MTFs were often holding and monitoring patients for lengthy periods.[129] As a result, AARs from OEF/OIF recommended the need

[125] During OIF, a US Army Air Ambulance Company supported 1 MEF (a first) and the USNS Comfort was used for the care of EPWs/DCs; nonetheless, significant issues between services must be resolved to ensure interoperability in future operations, OIF 141 and OIF 8092. Need for a standard joint reporting system, OIF 140, OIF 15098 and OIF 8026.

[126] Inadequate mobility of the CSH, TPFDD issues and restrictions placed by the government of Kuwait all affected the planner's ability to accommodate EPWs/DPs. The plan called for a handoff of Iraqi wounded to civilian agencies or Iraqi hospitals, but due a high threat environment, the plan did not occur. Back up, was the use of the USNS Comfort, but a reluctance to support and its early departure complicated the ability to provide level III medical support within Iraq during early stages of the operation, OIF 7104, OIF 5961, OIF 6028, and OIF 7017.

[127] OEF 6019, OEF 5681, OEF 5679, OEF 5669 and OIF 15124. OIF lesson reveal that the enemy was specifically targeting soft-skinned vehicles, to include medical vehicles and MTFs, OIF 15103.

[128] C/82 FSB operated out of a GP medium tent with a compliment of two (2) sickcall and trauma MES (-). TACSAT was adequate but often admin issues prevented the sender's message of delivery through BDE channels; most direct and reliable form of communication was the iridium phone, OEF 5796.

[129] A medical company would require additional 20 x 91WM6s for the Holding Squad, OEF 5637.

to turn the medical company's 20 patient hold cots into hospitals beds, thus complimenting the FST concept in current battlefield conditions.[130]

The FST, when attached to a medical company, was a force multiplier. There were arguments to push the FSTs as far forward as tactically feasible. However, there must also be a general understanding of what the element's mission and task are in order to alleviate any potential disconnect.[131] The FST must have the proper support to perform its mission, without those assets, it significantly reduces its capabilities.[132] Nevertheless, OEF questioned the proper utilization of a FST. The team often conducted non-doctrine tasks such as MEDCAPs, sick call and medical processing of prisoners. In addition, the FST acted independently, and thus limited the overall performance of the team. In essence, the FST became a medical company (-), expected to perform non-doctrinal tasks with capabilities it did not possess.[133]

OEF/OIF also revealed that there was little difference in the new institutionally trained medics "91Ws" and the past medics with the MOS of 91B. Reports state a common argument that the 91W

[130] A medical company (light) has 20 cots, recommendation to turn those cots into 5 ICU beds, 5 ICW beds, and the remaining 10 cots remain into MCW beds, with a nurse and 2 medics in each, OIF 15282.

[131] OIF 15292, OIF 15107. When a FST is collocated with the FSMC, must be a common understanding of what is required of each medical entity, OEF 5642.

[132] The medical teams, forward surgical (TOEs 08518LA00 and 08518LB00) are designed to be dependent upon the appropriate elements of corps or division to provide religious, legal, unit-level HSS, finance, food service, personnel and administrative services, logistical support, generator support, unit maintenance, and communications and information management. The FST in current operations has demonstrated a need for flexibility to include a need for the FST to conduct limited stand-alone operations. If deployed as a part of a multinational or coalition force, joint task force, or in support of special operations forces (SOF), the conventional support base that the FST relies on may not be present in the theater of operations (TO). In order for the FST to successful while operating under these conditions in the future, it is critical that the HSS planner consider personnel and equipment augmentation. The must consider the following areas: command, control, and communications (C3); medical operations planning; power generation; vehicle maintenance; food service; force protection (security); patient administration; pharmacy; patient holding; instrument sterilization; Class VIII resupply; medical equipment maintenance and repair; x-ray; medical laboratory; and sick call (primary care physician). Headquarters, Department of the Army. *Employment of Forward Surgical Teams*, FM 4-02-25 (FM 8-10-25), Washington, DC: March 2003, 2-2 – 2-3.

[133] OEF lessons reveal that doctrinally, the FST requires support from a medical company. Without that support, it needs augmentation and the appropriate resources to perform non-doctrinal tasks. Failure to resource the FST greatly reduces the team's capabilities. If this is the trend of the future, the FST needs reorganization, to include an update of doctrine, to adequately provide that support, OEF 5765 and OEF 5846. Reports indicate that an autoclave to include portable x-ray machine would have been an appropriate if not co-located with an FSMC, OEF 5659, OEF 5847 and OEF 5649.

training is *"to civilianized"* and thus needs more emphasis combat injuries (e.g. penetrating trauma).[134] Reports also indicate a common trend is that medics are not receiving adequate training at home station and as a result, the 91W loses his medical proficiency. However, those units who train their medics at home station find a dramatic increase in proficiency.[135]

In terms of hospitalization, both operations revealed the need for the CSH to transform its facility for the fast-paced battlefield of the future. Reports indicate a need for a modular, mission based, *"plug and play"* system, which can support all phases of a military operation in a full spectrum environment. In OEF/OIF, the CSH was unable to move once in theater due to intense maintenance operations and logistical requirements.[136] Some of the highlighted issues focused on a need to replace the MTFs Dolly Sets, equipment used to transport the Level 3 MTFs, and resolve issues such as sufficient power generation capability, water storage, and medical equipment to support split-based operations.[137]

There must also be a consideration of what other US Level 3 MTFs are available within theater and ensure a cross coordination for efficient medical support. As previously, mentioned, there was an overall lack of interoperability within the theater and a tendency for redundancy of medical assets. This could have been prevented if cultural barriers between services were broken, thus helping in the integration of medial assets. [138]

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[134] The 91W interviewed indicated the need for more combat trauma and skills practice in AIT, OEF 5730. The field recommendations was that the AMEDD C& S 91W training needs to incorporate the challenges of combat, dealing with night condition and fatigue, OEF 5704 and OIF 15279.

[135] Medics need extensive training to include training using the MPT programs at home station. The program gives medics experience in critical areas of patient care and an improved grasp of clinical judgment; should include rotation of medics through emergency rooms at home station, OIF 15119, OEF 5626, and OEF 5717. Tactical Combat Casualty Care Course (TCCCC) offered at one unit, states better prepares medics, OIF 15004.

[136] Reports indicate the *"plug and play"* system could provide for minimal care, specialty care, care of EPWs/ detainees, humanitarian care, microbiology lab, etc., OIF 134, OIF 7105, OIF 5997and OIF 5910. There was difficulty in supporting EPWs/DPs in OIF due to the movement of the CSHs on the TPFDD; and due to maintenance and logistical requirements CSH. These factors all contributed to the MTFs not being operational for several weeks, OIF 137, OIF 5958 and OIF 6006.

[137] Dolly sets are maintenance intensive, cannot withstand the distances, weight and speed that units encountered during OIF and other operations, OIF 8035, OIF 8059; capabilities of the CSH must be reviewed, OIF 8060.

[138] OIF lessons questions the utility of the USNS Comfort, as a joint *'gate keeper'* for beds, its prioritization of casualties - USMC versus Iraqi EPWs/DPs and the need for a policy on cross-leveling patients, OIF 8094.

In terms of medical logistics, OEF/OIF revealed that most medical logisticians lacked in experience and expertise when planning military operations. Reports related logistical problems to inadequate institutional training, including pre-command and other leader training opportunities.[139] This lack of institutional preparation and home station training also contributed to an inadequate understanding and utilization of the TAMMIS/DMLSS automation systems.[140] There was also a need to integrate medical logistics planners during the planning process to include an understanding of potential humanitarian assistance operations.[141] As a result, critical MED LOG nodes were not in position before launching military operations, exacerbating the difficulty of receiving medical supplies within theater.[142]

OEF medical units that did deploy with Class VIII, deployed with 30 DOS, but quickly found that this was not adequate to support their operations. Contributing factors included the lack of planning and inability to acquire visibility over Class VIII flowing into theater.[143] The Theater Customer Assistance Module (TCAM) was designed to maintain visibility of Class VIII. The system began in 2002 but tended to further complicate the problem of Class VIII visibility since most active component medical supply sections were still working with the older TAMMIS.[144] Like the tactical internet and iridium phones, the lack of bandwidth within theater hampered the effective use of the TCAM system. To further contribute

[139] Inadequate home station training on Class VIII; this training should be conducted at company and battalion levels and a part of the training at the Combat Training Centers (CTCs), OIF 240 and OEF 5635

[140] Pre-deployment, inventory was not maintained in TAMMIS or DMLSS database due a lack of manpower; Medical Logisticians did not use the MEDLOG systems in peacetime and thus lacked the skills to submit requests through TAMMIS or DMLSS. TOE assignments do not give Medical Logisticians adequate systems training, OIF 8028

[141] OEF 5644, OIF 257 and OIF 236. Many CAPs initiated and performed were dental, medical, and veterinary; ARRs identify shortcomings in current Army MESs, OEF 5648 and OEF 6024.

[142] Difficulties of providing class VIII due to oversight of planners at all levels; isolation of units and extended LOCs also a significant contributor; need for ingenuity in establishing medical resupply within a specific AOR, OEF 5695. Medical supply system does not adequately support ARSOF; recommendation to use the "MARGE BUNDLE" packages as in Vietnam, OEF 6023. Need for joint integration and coordination when conducting military operations. Requirement for a relook at current doctrine, at both US Army and Joint Services, to include the joint integration of other services to support an AOR, OEF 5687 and OIF 15375. OEF 5850 and OEF 5788

[143] The OIF original plan was to push level III CL VIII directly from Qatar to Corps Hospitals that would have been located at open airfields; however, the plan did not occur and there was no adjusted to the plan. No visibility CL VIII arriving in theater, OIF 15401, OIF 6080 OIF 6080 OIF 15300

[144] TCAM is a windows-based computer supply ordering system requiring internet connectivity; unfortunately, many customers in theater did not possess internet connectivity, poor understanding of "work-around" for order medical supplies; some units had little desire to learn the system, some deployed without their system, and units deployed without a derivative Department of Defense Activity Address Code (DODAACs), OIF 15055.

to the inability to acquire Class VIII, the TCAM files were often to large for a customer to download or send.[145] There were also systems glitches in the ability to conduct interface between USAMMA Systems, Applications and Products in Data Processing (SAP) systems and TAMMIS / DMLSS.[146] However, once the initial problems were resolved the system seemed to perform adequately and reliably.[147]

In terms of medical regulation and evacuation, OIF reports highlight the difficulties of supporting long evacuation routes in which the doctrinal approach did not adequately support a tactical unit.[148] The extreme distances also contributed to difficulties in providing command and control for MEDEVAC operations. However, OIF highlighted the value of attaching MEDEVAC to a aviation C2 element, which in return gave the MEDEVAC crews better overall A2C2. Due to the current doctrinal alignment, MEDEVAC assets are not afforded access to air coordination order (ACO), aviation maintenance support, aviation weather, timely intelligence, situational awareness and requisite coordination with attack aircraft escort. However, once under the control of aviation task force, the MEDEVAC assets received the required command and control and improved the unit's ability to accomplish its mission.[149] To best support the tactical units, a MEDEVAC crew would then preposition forward before the tactical unit began their operational mission.[150] Even though MEDEVAC often operated under the aviation task force for C2, MEDEVAC units were still inadequate in communications capability and had difficulty obtaining adequate maintenance support.[151]

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[145] Unable to download multi megabyte catalog files over the iridium telephones, which possessed a 9.6 Kbps max data throughput, similar difficulties with passing data over the TAC LAN, OIF 15084 and OIF 15301

[146] There were information gaps and lack transportation interface for theater distribution, no use ULLS-G/SAMMS for medical equipment maintenance. Automated MEDLOG systems enabled JIT acquisition strategies, but were not integrated across AMEDD, OIF 242.

[147] OIF 15302.

[148] Established FARPs and unit TTPs to support the operation shortened the MEDEVAC response time by 30 minutes. At hot LZs, unit reduced time/distance for evacuation by hovering an aircraft out side of enemy weapons range, once a break in the fighting conduct evacuation. MEDEVAC took 45 minutes - POI to MTF, OEF 5679.

[149] OIF reports indicate that the A2C2 of MEDEVAC aircrews were vastly improved. Reports highlight the 101st Airborne (Air Assault) Division Gold Book as a good basis for transition, OIF 5669, OIF 8008 and OIF 15432

[150] OIF 15433. Habitual relationship with the supported unit is essential to ensure consistent and effectiveness of C2. Habitual training required at the CTC(s), OIF 8006

[151] Some air ambulance units were able to obtain flight information by having 93Ps, which allow the units to acquire SIPR net access, OIF 15415 and OIF 15421. Also need for DNVTs, OIF 15414

In terms of medical regulation, MRO operations also depict a lack of MTOE communications capability and a resulting reliance on iridium phones to facilitate medical regulating activities. Reports argue the need for a user-friendly joint patient movement automation and information system (AIS) for the intratheater/intracorps capable of communication through multiple communication systems, i.e. TRAC2ES. In addition, there should be a means to track the individual patient with a *bar code/computer chip* (Dog Tag), which one can *"scan"* and immediately enter the patient into an overall joint tracking system.[152] OIF also revealed that MROs were not proficient in their use of automation/information systems to include communication systems and were often not integrated in operational planning.[153]

UA/UE Transformation – The Nature and Dynamics of the US Army Future Force

The Army's Future Force will consist of operational units called Units of Action (UAs) and Units Employment (UE_Xs). These highly deployable elements will be able to enter an area of operation, ready for combat operations. The Future Force will possess the overall ability to immediately gain information superiority and situational awareness, developing a situation out of or in contact with clarity. [154] The UAs will be the primary tactical warfighting unit for the Future Force, consisting of brigade size elements with the potential to operate independently when needed. The UA primary focus is to act decisively by closing with and destroying enemy forces by *"seeing first, understanding first, acting first and finishing decisively."*[155]

The UA will consist of combined arms battalions supported by additional organic maneuver, maneuver support, and maneuver sustainment organizations. In 2012, the US Army will begin to

[152] The system applied in OIF was insufficient and unreliable in majority of MTFs, OIF 8095, OIF 8099, OIF 15202 and OIF 15381. There was also value in using Micro Soft Chat Room for Patient Movement Requests (PMRs), OIF 15388. OIF notes technological use to track patient, OIF 138.

[153] The PMRs were requests for bed designations at a level III MTF based on patient data. The 3rd MEDCOM MRO determined receiving MTF, info was then sent to the 30th Medical Brigade MRO via the chat room who would then notify the requesting MTF of the receiving facility followed by coordination with the co-located evacuation assets for the patient movement.

[154] U.S. Army Training and Doctrine Command. *The United States Army Future Force Operational and Organizational Plan for Maneuver Units of Action,* TRADOC Pamphlet 525-3-90. Fort Monroe, VA: 2003, 2, 12, and 27.

[155] Ibid, 9, 13 and 21.

modernize the modern brigade combat teams with the Future Combat System (FCS). The FCS will consist of a medium-weight armored vehicle, possessing advance mobility and technologies; the system alone will be able to minimize personnel and logistical footprint in theater. [156] With the FCS, the UA can execute any given mission, but will primarily have a distinct offensive orientation.[157] If necessary, the UA with its mobility, lethality and support systems to include the integration of joint fires and effects will initiate a *mobile defense* to deprive the enemy initiative. It will immediately follow by a transition to the offense at the earliest opportunity.[158]

The general concept of the Unit of Action calls for a fast-paced, distributed operation. The elements battlespace of 300km x 300km, will consist of dispersed combined arms battalion operating under the protection and situational awareness given by the Reconnaissance, Surveillance and Target Acquisition (RSTA) battalion, Intelligence, Surveillance and Reconnaissance (ISR) assets, and other sources. Within the unit's area of operations of 90,000 square kilometers, combined arms battalions will operate within smaller, non-contiguous areas, synchronizing their operations and rapidly executing tactical tasks through their organic combined arms companies. [159] Figure 1 provides an example of a UEx conducting military operations.

[156] The Army's *O/O Plan for Maneuver UA* states that the FCS will allow the UAs, to gain an accurate situational understanding followed by movement to achieve positional advantage before it closes in on and destroys the enemy. Its rapid, precision maneuver will also permit combat elements to avoid enemy strengths, attack with surprise the enemy's flanks or rear unexpectedly, 9, 11, and 41.

[157] TRADOC Pamphlet 525-3-90, 9.

[158] Ibid, 24, 31.

[159] Department of the Army TRADOC. *Unit of Employment (UE) Operations, White Paper, Version 3.5.* Working revision as of 16 July 2004. Washington: CPO, 2004, 106.

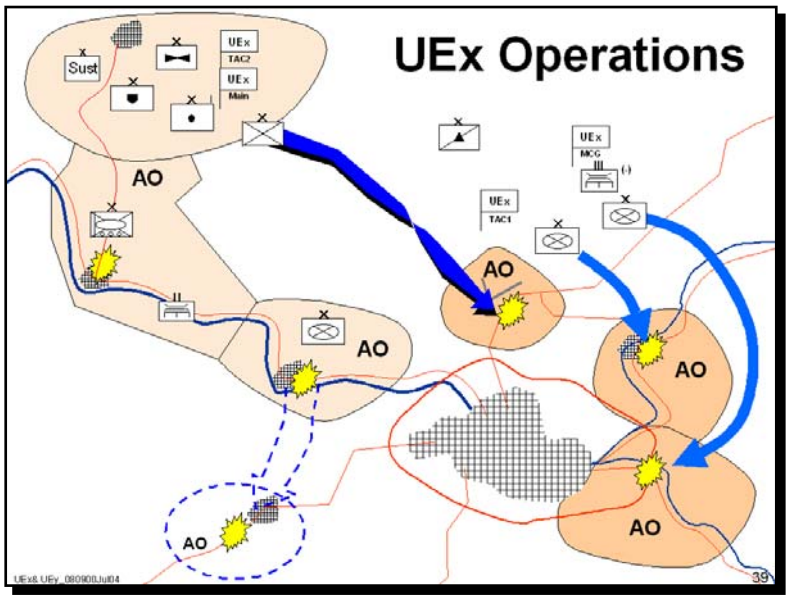

Figure 1: An example of a UEx operating on an independent line of operations. [160]

The UE_X will be a tailorable, higher-level echelon that will integrate and synchronize Army, Joint and Multinational forces for FSO at higher tactical and operational levels of war. It will link ground and joint forces and orchestrate ground operations that decide joint campaigns possessing the capabilities to act as the ARFOR Component, Joint Force Land Component Commander (JFLCC), or the JTF. [161]

In addition, the UE_X will facilitate the deployment of forces while assisting the tactical unit in developing the situation and gaining information superiority; it will possess systems that will allow it shape and isolate of forces within a given battlespace. The element will be able to synchronize, facilitate and direct military operations, to include sustainment operations, in order to maintain a constant tempo when in battle or an engagement.[162] More importantly, the UEs will help link Joint, Interagency, Multinational (JIM), non-governmental agencies to include the employment of long-range fires and aviation assets for the tactical UA.[163]

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[160] TRADOC Pamphlet 525-3-90, 24.
[161] Ibid, 13-14.
[162] Ibid, 8, 13, 35, and 39.
[163] Unit of Employment (UE) Operations, White Paper, Version 3.5, 12, 83 and 102.

The Current Dynamics of FHP to Support the Future Force

The combat lifesaver and combat medic will still be the primary means of care at point of injury providing enhanced first aid and emergency treatment (EMT) as required. The medical platoon leaders of the combined arms battalions will still provide command and control over his platoon, plan medical support and advise his tactical commander on the health of his battalion. Treatment squads and evacuation crews will still be conducting their doctrinal mission as described within the current force. However, due to the UAs dispersion of forces to include the extreme distances encountered within its battlespace will require far forward medical care to include life-saving *"damage control"* surgery when tactically feasible.

At Echelon 2, the medical company will expand its efforts and include a *"plug in"* far-forward emergency resuscitative surgical capability; and located within the Brigade Support Battalion's area of operations. The presence of far-forward resuscitative surgical care within the UA provides an organic emergency (urgent) surgical capability in order to reduce the loss of life, limb or eyesight.[164] The Level 2 medical company within Brigade Support Battalion will still provide its doctrinal medical support.[165] Its design will still be consistent with current doctrine, but with the addition of an Executive Officer in the company headquarters. However, the medical company will see a reduction in the number of treatment squads, from three squads to two squads, as prescribed in current doctrine.[166]

In the future, the company's evacuation platoon will change from current doctrine. It will be comprised of a headquarters, four Area Support Evacuation Squads, and four Forward Support Evacuation Squads. Each Area Support Evacuation Squad consists of two ambulances each with a crew of two medics: one ambulance driver and one emergency care medic; their mission will be to evacuate casualties from forward BASs to the medical company. The Forward Support Evacuation Squad made up of two MEVs will each have a crew of three medics: one ambulance driver and two emergency care

[164] US Army Office of the Surgeon General. *Medical White Paper*. 22 June 04, 2-3.
[165] FM 4-02.06, Medical Company TTPs, 2-3 to 2-5.
[166] One treatment team stays at the FSB, forming the treatment base for the company, while the other treatment squad provides support forward or can either reinforce or reconstitute a BAS, Change 2 to TRADOC Pamphlet 525-3-90 O&O Plan, 3-13 to 3-14.

medics. The MEVs in the forward support evacuation squad will be the primary source of replacement for those platforms lost or damaged within the UAs operational area. In terms of the air ambulance, it will still be the primary and preferred means of medical evacuation on the battlefield. However, the forward support MEDEVAC platoon (FSMP) will deploy from the UE air ambulance company, which in the future will be assigned to the Aviation UA.[167]

The AMEDD Medical Reengineering Initiative (MRI) and Adaptive Medical Instruments (AMI) Early Entry Modules (EEMs) of CSHs will be fully mobile and will insert by air, sea or ground into their area of operations. The hospital will possess the ability to adapt its organization, from one operating room to 3 operating rooms and from 44 to 248 (intensive and intermediate care) beds, based on the needs of the mission. The facilities may receive augmentation of TO&E surgical and medical specialty teams when required. As the theater matures and additional forces arrive, medical assets will be task organized to create an environment of medical support arrayed for effective and efficient coverage of the mission set within the defined Area of Operation from JOA to Theater.[168]

The AMEDD is also currently looking at EEMs of either a Multifunctional Medical Battalion (MFMB) and/or Medical Support Command (MSC) to provide command and control over medical operations. These headquarters will possess the capability to optimize medical care for soldiers in future battlefields. The specific element and size of the headquarters will depend on the complexity of the battlefield to include the need for the appropriate command and control to facilitate medical support in a theater of operations. The EEMs will also regulate intra-theater evacuation of patients from the medical

[167] *TRADOC Pamphlet 525-3-90 O&O* states that due to the distances and dispersion, there will be an increased reliance on *"enroute care"* by medical personnel; this is to keep the casualty alive during longer evacuation periods. Medical platforms will need the ability to provide *"enroute care"* by possessing such enablers as on-board oxygen/oxygen generation systems, physiologic monitoring, telecommunications, and other life support equipment, ibid.

[168] US Army Office of the Surgeon General. *Medical White Paper*. 22 June 04, 2-3.

treatment facilities to Theater level treatment facilities; provide clinical consultation in closer proximity to the Forces within the UEx, and control distribution of Class VIII and blood far forward in the AOR. [169]

Early Entry Modules embedded with US Air Force (USAF) aeromedical evacuation liaison teams (AELTs) will coordinate the strategic evacuation linkage with USAF aeromedical evacuation aircraft to include the presence of Air Critical Care Air Transport Teams to ensure en route intensive care for critically injured Soldiers. Depending on the mission, other service medical units may provide specific capabilities integrated into the theater scheme of medical support under the direction of a medical task force supporting UEy/UEx/UA.[170]

Issues Affecting the Medical Transformation to Support the Future Force

As the US Army focuses on its future, what medical issues immediately emerge from the transformation of our force? In terms of patient treatment and area support, there is a requirement for a robust and appropriately tailored area medical support system. This is essential in ensuring that medical resources are not overwhelmed and the support provided to forces is timely. There will also be a great need for highly mobile FSTs incorporated within the medical surgical company of the UA; it will be crucial in providing the initial-entry surgical capability necessary for support until the patient is evacuated to a theater MTF. Additionally, these elements must be capable of conducting split operations to support forward maneuver elements if required. A significant challenge is the transition of our Level 3 MTFs to a

[169] The *Medical White Paper* states that the EEM of a Multi-Functional Medical Battalion will command medical task forces in small-scale operations for larger contingencies and depending on the need for definitive treatment capability, a CSH Commander may assume the role of Medical Task Force Commander. Once a UEy deploys, the EEM of the Medical Support Command (MSC) may deploy to strengthen the links to the theater command and control element. This will depend on the environments level of complexity and a need for an increased medical presence. The MSC provides an increased Theater-wide communications capability to include technical and clinical staff experience for a complex environment. The MSC will be able to coordinate for employment of medical units to include incoming units at ports of entry. Medical UAs will arrive simultaneously in theater with a UEx headquarters, and only when the number of units, geographic displacement and complexity of operations exceeds the capability of the MSC, will provide technical supervision of medical TFs operating in the AOR of each UEx, 2-3.

[170] 3.

flexible and mobile facility capable of supporting all phases of a military operation. However, the size and composition of hospital resources will also be dependent upon Joint capabilities available.

Patient Evacuation and Medical Regulating will also be a significant issue as we engage and fight on a widely dispersed and nonlinear battlefield. As the battlefield continues to expand this may present a substantial challenge in our support for the future. More importantly, it may also present a change to the current medical system as we now know.

Historically, medical logistics continues to reveal itself as a critical issue and may continue to plague our efforts in the future with the answer to the problem lying in technology. Nonetheless, for all medical units, Medical C4I will be integral part of the Future Force. In order to effectively communicate and conduct medical support within the Future Force we must be able to exchange information in order to facilitate operations. The Medical Communications for Combat Casualty Care (MC4) and Theater Medical Information Program (TMIP) will be the key enabler to accomplish this task. The intent of this system is to link commanders, health care providers and medical support at all echelons with integrated medical information.

CHAPTER III

The Medical Functional Areas Analysis

The US Joint Forces Command's (USJFCOMs) Joint Operational Environments (JOE) highlights that our future operating environments will be extremely fluid all under complex conditions and terrain. The operations will be Joint in nature and will require a complete understanding and synchronization of those assets. Our forces will be able to rapidly deploy, enter a theater of operations combat ready, and immediately begins military operations. They will utilize enhanced system's lethality to dominate all phases and spectrum of the operations anywhere in the world. Our alliances, to include coalitions, will also be a norm and a part of our operations, not only today but also in the future. In terms of battlespaces for our Future Forces, the UAs will rapidly and decisively operate in dimensions of 300km x 300kms. Our LOCs will also be extreme in distance, but will be the sustainment links for UA/UEs.[171] The Future Force infrastructure will be limited; it will have no lengthy staging periods, but will still be able to adequately support all deployments and phases of an operation.[172] It will also mean that in the future our forces will have to embrace the nonlinear environment as well as the linear.[173]

In terms of our adversaries, the JOE envisions that our potential enemies will use an asymmetric approach.[174] Our enemy's will attempt change the nature of the conflict once US Forces begin deployment, both at home and abroad, hoping to render the forces in transit ineffective. They will focus on identifying our weaknesses and attempt to exploit those weaknesses at any given moment. Our future adversaries will also utilize urban areas to include complex terrain to evade our technology, intelligence, and weapon systems. They will also attempt to disrupt power-projection capabilities by attacking installations, information systems, or transportation nodes. This also means that force protection for US

[171] Department of the Army TRADOC. *Unit of Employment (UE) Operations, White Paper, Version 3.5.* Working revision as of 16 July 2004. Washington: CPO, 2004, 116.

[172] Department of Army DCSINT. *Threat Panel White Paper.* Washington: GPO, 1999.

[173] US Joint Forces Command (JFCOM). *The Joint Operational Environment - Into the Future.* This is coordinating draft as of March 5, 2004. Norfolk, VA: 2004, 35.

[174] Threat Panel White Paper.

Forces will be crucial when units are operating on LOCs or in staging bases in the rear area. Finally, yet importantly, our adversary may employ Weapons of Mass Destruction (WMD) as a means to cause mass casualties to deter US commitment. This is all in accordance with the newly published Joint Forces Command Joint Operational Environment handbook and the vision of what US forces will potentially encounter as it fights on the future battlefields of tomorrow.[175]

Lethality and Casualty Rates

Since the days of the Greeks, nations have had to deal with the effects of casualties due to war. They have often caused Armies to change their tactics due to emerging weapons, for those that have not, have suffered large deaths such as the ones seen on the battlefields of World War I. To understand casualty rates of the future, we must attempt to understand the casualty rates of the past. Since 1860, weapons lethality has increased dramatically. Nations have managed to take a weapons system and increased their lethality due to technological advancements. As a nation increases its weapons lethality, its adversary historically adapts and changes its tactics and combat formations in an attempt to mitigate the killing power of the new technology.[176]

Gabriel and Metz mention that inevitably, the result was a dynamic balance of behavior and technology that usually results in a state of affairs where the killing power of the new weapon remains somewhat higher than the weapon it replaced. The two authors also highlighted that failure to adapt to the killing power of enhanced weapons system normally leads to what occurred on the battlefields of World War I. They also highlighted a similar incidence in ODS, in which Saddam Hussein's forces engaged the American firepower with the same defensive tactics he had employed in the Iran-Iraq War. However, Hussein saw the vast amount of his forces destroyed in less than 100 hours of fighting.[177]

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[175] USJFCOM. The Joint Operational Environment - Into the Future, 7, 52 and 169.

[176] Richard A. Gabriel and Karen S. Metz. *A Short History of War: The Evolution of Warfare and Weapons.* Strategic Studies Institute, U.S. Army War College, Carlisle Barracks, PA: 1992.

[177] Ibid.

Trevor N. Dupuy attempted to calculate the effects of weapons and their killing power as it relates to the weapons changes in technology and characteristics. He used a number of objective factors such as rate of fire, number of potential targets per strike, relative incapacitating effect, effective range, muzzle velocity, reliability, battlefield mobility, radius of action, and vulnerability. He did this in attempt to further calculate what he called the *Theoretical Lethality Index* for each weapon, which specified its lethality power. However, Dupuy discovered that these objective factors, when calculated against the single variable of dispersion, changed radically in their ability to produce casualties under actual battlefield conditions. His result was that when measured over time, the measurable casualty effects of modern weapons paradoxically resulted in far less casualties when measured against the weapons of the past.[178]

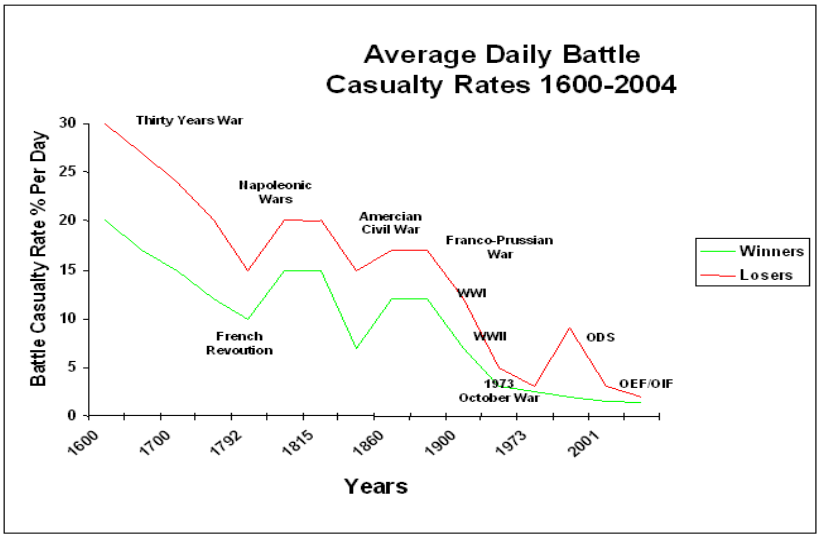


Figure 2-Average Daily Battle Casualty Rates of Soldiers in Wars since 1600. [179]

Dupuy also discovered other historical patterns and trends with respect to attrition in ground warfare, in which his analysis was from 1600 to 1990:

[178] Dupuy, 47.

[179] Dupuy states the numbers are based average casualty rates of 30,000 to 70,000 troops since 1600-2004, 314.

1) “Increases in weapons lethality [are] offset by increased dispersion of troops so that daily battle casualty rates have declined from 1600 until the current era [1990];” 2) “winners consistently have lower casualty rates than losers. Since attackers tend to win more than defenders, this means that attackers have lower casualty rates than defenders most of the time.” 3) “Casualty rates for smaller forces are generally higher than those of larger forces [when] under the same circumstances”; 4) “the force with the higher relative combat effectiveness tends to have lower casualty rates than the opposing force. This is because forces with higher combat effectiveness use their weapons more effectively, are less likely to incur damage due to tactical or doctrinal errors and (although this is perhaps a cause more than an effect) tend to win, other things being equal.” [180]

Table 2-Dispersion of Forces on the Battlefields since 1600. [181]

	Antiquity	Napoleonic Wars	Civil War	World War I	World War II	October War 1973
Area Occupied by Deployed Force 100,000 Strong (sq km)	1.00	20.12	25.75	248	2,750	4,000
Front (km)	6.67	8.05	8.58	14	48	57
Depth (km)	0.15	2.5	3	17	57	70
Men Per Sq Km	100,000.00	4,970.00	3,883.00	404	36	25
Square Meters/man	10	200	257.5	2,475	27,500	40,000

Dupuy also noted that when measured against the non-gunpowder weapons of antiquity and the Middle Ages, modern weapons, excluding nuclear weapons, have increase in lethality by a factor of 2,000. Nevertheless, while lethality increased by a factor of 2,000, the dispersion of forces on the battlefield had also increased by a factor of 4,000. In other words, since 1865 wars have killed fewer soldiers, as a percentage of the deployed combat force, than was the case in previous wars. The only time this did not occur was during the Napoleonic wars in which French forces utilized the tactical field formation of the packed marching column. Table 2 depicts the rates of casualties as a percentage of the

[180] Ibid., 47.
[181] Ibid., 312.

committed forces for both the victor and defeated to include the dispersion of units and forces along previous battlefields.[182]

Adamson's study of casualty rates from antiquity to Korea reaches the same conclusion with respect to mortality rates. Given that weapons changed little from the times of antiquity through the period of the Middle Ages, it might be somewhat safely assumed that the data provided for the Greek and Roman periods were roughly similar to that of the later periods of antiquity prior to the advent of gunpowder weapons. Figure 3 presents the mortality data for various wars at different periods of history with the lethality of weapons factored in along the time dimension. The results of the data demonstrate that although weapons became increasingly lethal with each war, the mortality rates for each war tended to decline with the highest found during wars of antiquity and the lowest reflected in modern wars. Once again, the conclusion is that adjustments in tactics, mobility, and dispersion have largely offset the increased killing power of modern weaponry. [183]

The casualty rates since 1990 have also reflected the same trend as Dupuy and Adamson state in their studies. In analyzing the US Army fatalities on the battlefield since 1990, Desert Storm, Somalia and Operations Enduring Freedom and Iraqi Freedom, all continue to reveal a decrease in the mortality and died of wound rates. Force protection measures continue to contribute to a decrease the percentage of battle casualties that are KIA to roughly 10%, while the increase in medical technology and enhanced treatment capabilities have kept the percentage of soldiers dieing from wounds to fewer than 3%. Figure 3 also depicts the decrease in rates since 1990.

Thus, as weapons lethality increases, the battlefield dispersion of forces also increases and as a result, the number of casualties decrease. As force protection improves and there is a continued increase in medical technology the number of killed in action and died of wounds will also decrease. It is easy to argue a common theme for the future as Dupuy, Adamson, and statistics from over the last 12 years depict of the past. *So where does this lead us to in the future?* The US Army's Future Force will have increased

[182] Ibid.
[183] P.B. Adamson. Journal of the Royal Army Medical Corps, Vol. 23 (1997), 97.

lethality of its weapons system and utilize precision warfare; a new type of warfare in which we have not seen in the history of civilization. The Future Force, possessing FCS, will also manage to operate rapidly and efficiently on dispersed battlefields of 300 x 300 kilometers, conducting decisive operations within a FSO. The lethality and dispersion are the same factors that Dupuy and Adamson iterate in their very studies. Then is there the assumption that there will be even fewer casualties or maybe no casualties on our future battlefields? The analysis seems to argue that there will be casualties but not as great as historically documented.

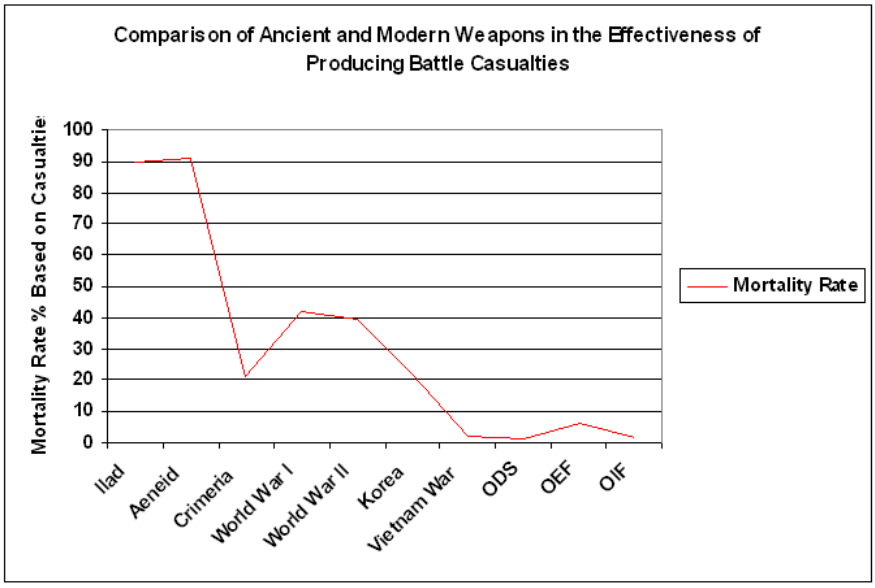


Figure 3-Adamson's Comparison of Ancient and Modern Weapons in the Effectiveness[184]

So, what could an anticipated casualty estimate look like in the future? Dupuy uses a personnel attrition model that dates back to 1945. He further argues that there have been no major wars since 1945, but there have been a large number of lesser conflicts. He gives examples of these lesser conflicts such as the Korean War, the Arab-Israeli Wars, the Iran-Iraq War and the Vietnam War. Dupuy states that most of the wars since 1945 have been minor conflicts smaller than the previously mentioned wars. He believes that even under the *"nuclear umbrella"* of the Cold War that minor conflicts would likely continue in the

[184] Ibid., 97. Adjustments were made chart to reflect rates since 1990 (ODS, OEF and OIF).

future. So, what is the significance of this? The significance of Dupuy's work was what he called the *"73-Engagement Data Base."* Dupuy compiled the 73-Engagement Data Base to provide insights on casualties suffered by sophisticated, modern armed forces engaged in minor conflicts. Dupuy also intended to use the database as a means to analyze engagements, which were representative of the kind of minor future conflicts in which US [Forces] would find it engaged in the future.[185]

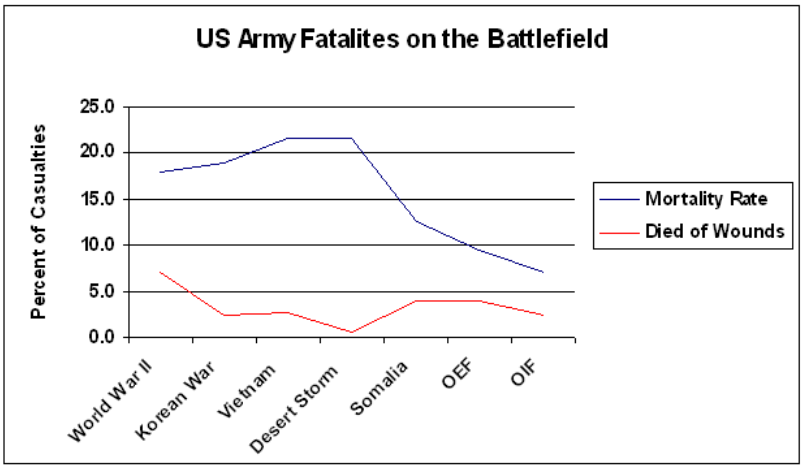


Figure 4-US Army Fatalities on the Battlefield[186]

Dupuy's analysis further revealed that there was an average mean when addressing the daily casualty rates for total battle casualties (TBC), killed in action (KIA), wounded in action (WIA) and considered missing in action (CMIA) for the 73 engagements as shown in Table 3. The information revealed that when related with circumstantial factors that a mean TBC daily engagement casualty rate was 2.6% per day with a standard deviation of .8% (1.8% as the low and 3.4% as the high). In terms of the other categories, he revealed that .6% would be KIA, with 1.8% WIA and .2% being considered

[185] Dupuy, 66-67.

[186] Korean War, Vietnam, and Desert Storm statistics acquired from *Washington HA Services*. World War II figures acquired from Dupuy's *Attrition* and Somalia casualty figures acquired from *Congressional Report Service*.

CMIA, which adds up to an overall TBC of 2.6%.[187] Dupuy specifically noted that from his analysis that company or battalion sized units involved in direct action within a minor conflict could expect to have a TBC engagement rate of 5.0% per day or less. He states that casualties rates any larger than this is possible, but would be only due to a catastrophic event rather than a normal conflict.[188]

Table 3. Dupuy's Composition of 73-Engagement Data Base.[189]

Table 3-Dupuy's Composition of 73 Engagement Data Base

	Minor Hostilities	Small Wars	Regional Wars	Total Wars
81-Engagement Data Base	60	18	3	81
Poor Casualty Data	-3	-3	0	-6
Mass Capitulations	-2	0	0	-2
73-Engagement Data Base	55	15	3	73

Dupuy also revealed that of the daily engagement casualty rate of 2.6%, approximately 20% of those casualties would be KIA, while 65% of all those hit on the battlefield will suffer relatively minor wounds and will in most incidences survive even without medical attention. However, 15% of those hit on the battlefield will fall into the category as seriously wounded and will die without appropriate medical care.[190]

[187] Dupuy's *Attrition* highlights the use of circumstantial factors consisting of terrain, weather, surprise, posture, air superiority, and means of initial entry, opposition, and organization type when generating casualty estimates, 72-73.

[188] Ibid., 77.

[189] Dupuy's book, *Attrition*, used data from *"modern"* Western type forces; he included data on conflicts that involved either the US or its allies. In addition, Dupuy excluded conflicts in Europe or Northeast Asia, 66-67.

[190] Ibid., 51-52.

Dupuy also highlights two other areas that tend to affect casualty rates: body armor and DNBI. He states that the use of body armor helps to reduce the number of KIAs from 25% to a 17% KIA rate. The reason is that body armor protects the soldier's torso, and is normally the greatest risk for hits and shell fragments.[191] Dupuy states that a DNBI rate is the result of four factors: the season of the year in temperate climates; tropical climates; quality of medical care; and incidence of battle casualties. Dupuy also recognizes three rules of thumb in estimating DNBI rates within a theater of operations:

> That the daily rate non-battle loss rate for a unit not in combat in temperate climates will be as follows:

Table 4-Daily Non-battle Loss for a Unit not in Temperate Climate

Daily Non-battle Loss for a Unit not in Temperate Climates					
January	0.30%	May	0.18%	September	0.21%
February	0.27%	June	0.15%	October	0.24%
March	0.24%	July	0.15%	November	0.27%
April	0.21%	August	0.18%	December	0.30%

> The daily non-battle casualty rate for a unit not in combat in a tropical climate will be 0.30% and for a unit in combat, the daily non-battle casualty rate for a unit not in combat will be increased by an amount equal to 20% of the projected battle casualty rate.[192]

In finalizing the overall casualty rates, Dupuy highlights that for each 100 casualties (battle casualty, disease or injury) that 75% of those casualties will consist of returned to duty (RTD) by the end of 20 days. He states they will return at the rate of five per day between the 6th and 20th days after admission. He also iterates that 25 will never be RTD, because of either death or evacuation to a higher

[191] Ibid., 54.
[192] Ibid., 57.

echelon of care out of theater.[193] Dupuy also suggest that these rates will vary because of the theater evacuation policy. The theater evacuation policy will determine the length of time that a patient will stay in theater. This also will depend on the medical capability within the theater, or evacuated to medical facilities outside the zone of operation.

Casualty Rates for the US Army Future Force

So, what are the casualty rates for the Future Force? In order to predict possible casualty rates for the Future Force, a medical estimate encompassing the deployment of the Future Force should occur. Currently, the *US Army White Paper Unit of Employment Operations*, Version 3.5 has a vignette that illustrates how a UEy may deploy in a contemporary environment. The scenario begins with UEy deployed forward conducting training with an alliance nation, country "A." However, tensions between countries "A" and "B" escalate and cause the US to commit forces to stabilize the situation. In determining possible casualty rates for the operation, Dupuy's historical rates of personnel attrition and the Medical Course of Action Tool (M-COAT) will be the primary systems used to generate casualty estimates.[194] To estimate DNBI casualties, the Central Caucus Region was a personally selected choice; but as a reminder to the reader, the actual sketches and deployment is of a hypothetical theater of operations.[195]

The US Army White Paper for Unit of Employment highlights the initial situation within the vignette:

> There is a UEy forward stationed within the AOR and acts as the ASCC for the combatant commander. The UEy is supporting regional security assistance with several small missions. It is also supporting a joint task force that is conducting stability operations in country "A" (referred to as A-land). The primary purpose of the JTF is to deter country "B" (referred to as B-land), and

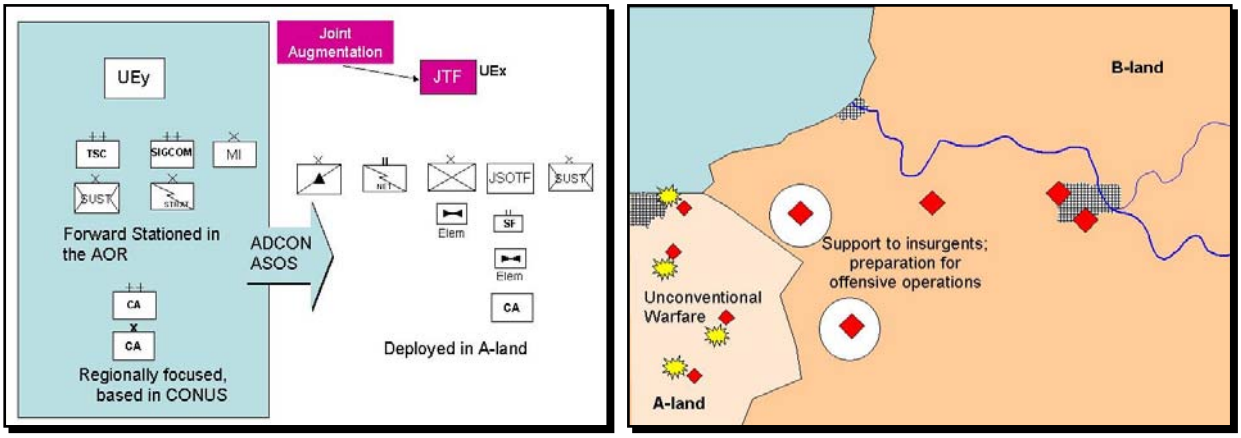
[193] Ibid., 53-54.

[194] US Army Medical Department (AMEDD) Center and School Force Structure and Analysis Branch. *Medical-Course of Action Tool (M-COAT).* Fort Sam Houston, Texas: 1999. The M-COAT is a Microsoft ® Excel ® spreadsheet developed by the Force Structure and Analysis Branch of the US AMEDD Center and School to determine casualty estimates. The M-COAT integrates data derived from the Force Structure and Analysis Branch and Dupuy's casualty estimation formulas in his book, *Attrition*: *Forecasting Battle Casualties and Equipment Losses in Modern War:* 1990.

[195] US Army White Paper. Unit of Employment (UE) Operations, Version 3.5, 100.

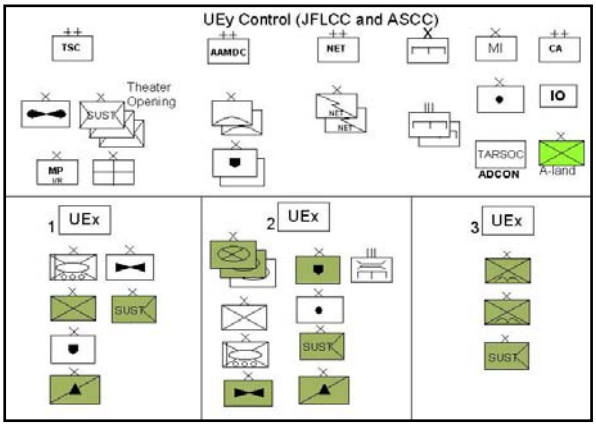
support foreign internal defense (FID) missions ongoing in A-land. B-land is ruled by a military junta, and is actively supporting an insurgency in A-land. The JTF is based upon a UEx headquarters. The UEy has operational control over a theater sustainment command, a theater MI brigade, and a theater signal command. The UEy also has an aligned civil affairs command based in CONUS. The UEy plays a crucial role in selecting and sequencing (e.g. force tailoring) Army forces for the regional combatant commander. Figure 5, 5a and 5b, depicts the UEy and situation in theater.[196]

Figure 5- 5a. and 5b. Notional and Theater Situation[1]



In the vignette, a UEx task organized with a RSTA brigade, MI battalion and additional UAV company, one light maneuver brigade combat team reinforced with aviation elements and a tailored sustainment brigade has deployed to A-land. The TSC is augmenting the sustainment brigade in country and possesses additional command and control elements. This allows it to support the JTF and provide Army support to deployed forces.[197] The primary medical care within the UEs consists of Level I-II with FSTs to include the UEs habitual MEDEVAC support.

[196] Ibid., 101.
[197] Ibid., 101-102.



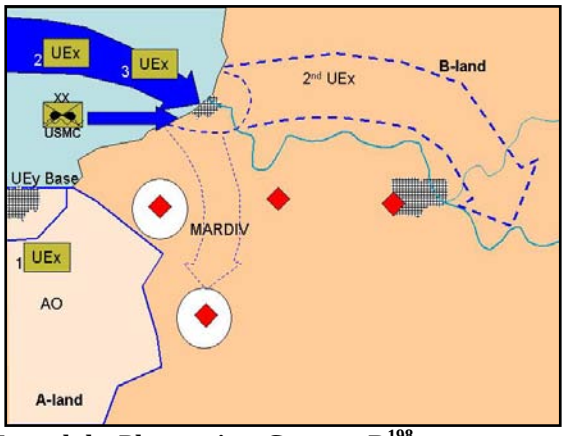


Figure 6-6a. and 6b. Army Forces under the UEy and the Plan against Country B[198]

The situation within the vignette begins to deteriorate:

> The ruling junta of B-Land, threatened by the US presence in A-land, increases supports to the insurgency [located in A-land], provides regular troops as "volunteers" for the insurgents, and positions surface-to-surface missiles and larger land forces on the borders of A-land. Repeated clashes between insurgents and US forces occur. US military forces receive orders to eliminate the insurgents, destroy B-land forces supporting the insurgency, and seize a 250-kilometer deep area of B-land to ensure the security of A-land. [The UEy identifies Army forces for the campaign.] [The forces] include the 2nd UEx with five maneuver brigade combat teams (3 heavy, one light, and one Stryker brigade), the 1st UEx deployed in A-land with two brigades (one Stryker and one light), and the 3rd UEx based at Fort Whitewall. [The 3rd UEx] will conduct forcible entry operations in B-land with two airborne infantry brigade combat teams. (Unit of Employment, 204, 103)[199]

In the initial stages of the operation, the forward stationed UEy is performing the task of the ASCC; however, once hostiles arise the combatant commander designates the UEy as the JFLCC. The combatant commander also disestablishes the JTF in A-land and places the Army forces OPCON to the UEy. The UEx will receive support from the Theater Sustainment Command, Signal Command, Civil

[198] Figure 6a illustrates the Army forces tailored to the various headquarters. Note that figure shows the UEy and UEx as tailored by the UEy. Forces shown are attached to their respective headquarters, unless if the forces were already assigned, 105. The forces shaded green is the forces initially under the control of the 1st UEx. Figure 6b depicts a sketch of the initial plan for the scenario. US Army White Paper. *Unit of Employment (UE) Operations*, Version 3.5, 2004, 106.

[199] Ibid., 103.

Affairs Command, a theater intelligence brigade, and attached engineer, air defense, medical, and other units assigned to the UEy.[200] See Figure 6a for an illustration of forces under the control of the UEy.

The concept of operations within the vignette tasks the 1st UEx to establish positions to defend the theater base along the coast of A-land. The 1st UEx receives the task to prepare for offensive operations against the insurgents while additional forces arrive in theater. The 3rd UEx receives the task to conduct a joint forcible entry operation with USMC forces, seizing a seaport and airfield on the western coast of B-land. The securing of the seaport and airfield afford US forces a base for operations for deployment and support operations to dislocate enemy forces located in the interior of B-land. The USMC force, OPCONed an Army Maneuver Enhancement Brigade (MEB) and an airborne brigade, conducts an offensive shaping operation to destroy bases supporting the insurgency. The 2nd UEx follows the deployment of the 3rd UEx. Once on the ground, the 2nd UEx conducts passage of lines and the decisive operations to seize a regional and transportation center near a large B-land city located in the country's interior. The 3rd UEx with one airborne brigade becomes the reserve for the duration of the decisive operation. The Theater Sustainment Command will develop the theater base along the coast of B-land; UEy provides maneuver enhancement brigades to the bases in A-land and B-land, and the air missile defense (AMD) will focus on protecting airfields within A-land and then B-land once areas are secure. Figure 6b illustrates the UEy plan.[201]

Before launching the decisive operation, the 2nd UEx receives an update on the situation and adjusts its operation.[202] The UEx then launches their decisive operation, seizing its objectives, isolating

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[200] Ibid., 103.

[201] According to the *US Army White Paper on Unit Employment,* the 2nd UEx conducts offensive operations with five maneuver brigade combat teams along a line of operations from the coast, extending to 300 kilometers in depth. Their tasks are to seize terrain, provide defense for forces arriving in theater, and o/o attack and encircle a B-land city, secures airfield and isolates enemy forces; subsequent operations are to destroy enemy forces within city. The Stryker brigade screens along the south flank, the aviation brigade conducts shaping operations while the fires brigade conducts precision strikes to support the operation. The MEB conducts sustaining operations and secures the UEx base. The UEx sustainment brigade moves to establish a tactical logistics base near a B-land airfield. MEB assumes control of the area around the airfield and maintains security, 105-109.

[202] The enemy forces do not attack during the forcible entry operations, but remains dispersed in villages and towns with the primary focus on using unconventional operations. Their conventional forces consist of armored battalions with tanks in firing positions under the close support of the infantry. They also possess numerous

the city and destroying enemy forces. See Figure 7a for illustration of the encirclement of the town. Because of the isolation of the major inland city and the destruction of additional forces by the Marine offensive, the Junta loses political power. B-land then experiences a counter-revolution and an Armistice immediately follows to include conditions for a cease-fire. The UEy now begins its transition to stability and support operations. The Armistice allows the surviving forces of B-land's regular army units to withdraw through US forces. The forces move to a designated area 50 kilometers north of the river. The US forces establish military areas within the country and began to work with local authorities to disarm the "insurgents" and return them to their homes. US forces also begin to assist local authorities with immediate assistance to mitigate effects of combat. See Figure 7b for the illustration transition to a protracted stability operation. Eventually, an agreement emerges that establishes a demilitarized zone in which US forces are to maintain until the establishment of a new government and withdrawal of US forces.[203]

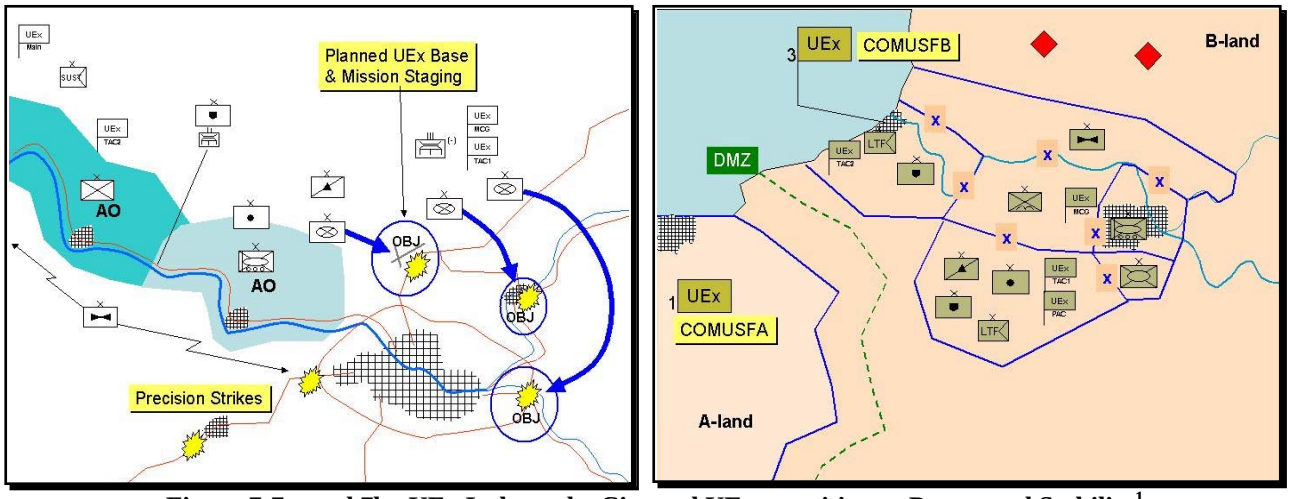

Figure 7-7a. and 7b. UEx Isolates the City and UEx transition to Protracted Stability[1]

shoulder-fired anti-aircraft missiles, making helicopter operations around these hedgehog positions difficult. US Army White Paper. *Unit of Employment (UE) Operations*, Version 3.51, 2004, 108-110.

[203] Ibid., 106-111.

The Casualty Estimate and Medical Assessment

It is worth noting, that the US Army White Paper, *Unit of Employment Operations*, states that there was no enemy activity in and around the APOD/SPOD as US Forces conducted its force entry into theater. However, to analyze and test the medical capabilities, the thesis will incorporate a worst-case scenario to help in identifying potential medical requirements and/or shortfalls. Another significant note is that the monograph incorporates two underlying assumptions not mentioned in the White Paper: 1) medical planners will ensure that the proper coordination and synchronization of logistical assets to medically support the ongoing operation and 2) medical planners will also ensure the proper integration of medical assets to best support the maneuver commander's plan and intent.

To provide a better understanding of how FHP may occur in this theater of operations, the author of this monograph took the liberty to develop a self-generated medical concept of support. The medical concept of support for theater operations is as follows: The key to this operation will be our medical systems ability to provide efficient far forward medical and surgical care to include the integration of Joint medical systems to assist in the rapid evacuation and treatment of US Forces to include EPWs and DCs when required. To meet the full spectrum demands of healthcare, we will ensure heavy coordination and integration of interagency support. There will be full synchronization of our medical functional areas, to include Joint assets, from point of injury to the highest levels of care. In the initial stages of the operation, medical assets must be prepared to hold their patients until Joint (*US Navy or US Air Force*) elements can evacuate patients to the next level of care. US Forces, in the initial entry, must possess the medical supplies to operate efficiently for 96 hours. However, land forces must ensure the proper coordination of joint assets to facilitate the support of medical supplies if needed. Utilizing the Strategic (STRAT) FOBs or Forward Operating Locations (FOLs), medical units will preposition assets at these locations and once forces secure PODs within our AO, medical elements will immediately begin their flow into theater. Once conditions are meet, an Early Enter Model (EEM), encompassing C4I, PNVTMED, VET, HSL and medical evacuation, will enter the theater to provide coordination and

facilitate the entry of medical units. This element will also help to expedite medical support in future phases of the operation; however, if the need arises, we must be flexible and prepared to support the theater of operations from the STRAT FOBs/FOLs based off METT-TC. Medical functional areas will rapidly enter the theater of operations; establish operations to medically support the flow of forces into theater while simultaneously preparing to support future operations. In the deceive phase of the operation, FHP will be continuous across the AO and focused on far forward medical and surgical care to include rapid evacuation. The rapid evacuation and regulation will allow patients to rapidly move to the appropriate level of care. Once patients are stable enough for inter-theater evacuation, Joint assets will then move patients to a higher level of care located in a STRAT FOB/FOL. Medical C4I is vital to this overall operation; plans will posses the proper integration and synchronization, to include communication and coordination, at all service, joint and interagency levels. Medical logistics is also vital throughout the phase's spectrum of operations; we will coordinate and establish Class VIII nodes in order to have continuous logistical support throughout the zones and area of operations. Simultaneously, all of the medical functional areas, to include PM, CSC, VET, and Laboratory, must be ready to support the full spectrum of military operations; we must maintain our mobility to include flexibility to transition within the spectrums when required. The endstate to this operation consist of medical functional areas in place, providing continuous FHP to US forces not only across the depth of the operating environment but in all spectrums of operations.

Phase I – Forced Entry

In this operational vignette, UEy forces conduct a forced entry securing the APOD and SPOD. The force consists of two (2) US Army Airborne Brigades with the task to secure the APOD, while simultaneously a USMC division secures the SPOD. Medically, the first forces into the theater must rely on Level 1 medical care. Both services will not have immediate Level 2 care, until later stages of the operation. Any patients requiring Level 2 or higher will have to coordinate evacuation to US Navy ships located off shore. However, Level 2 care should arrive a few hours later after initial entry and once on the

ground will establish in a centralized location of the airfield/port, and immediately provide Level 2 medical support for the forced entry. The Medical Company of the Brigade Support Battalion must have attached an FST with limited *hospitalization capacity* to care for and hold patients awaiting evacuation to a higher level of care.[204] The USMC division will have Surgical Company's with similar capabilities.[205] Each medical company must also possess US Air Force Aeromedical Evacuation Liaison Teams (AELTs) attached to their units to coordinate fixed wing evacuation to a higher level of care. In terms of Level 3, the echelon of care will not be able to arrive until later on in the operation. The elements in theater must either hold their patients or coordinate with the Amphibious Task Force (ATF) for rapid evacuation support to Patient Casualty Receiving and Treatment Ships (PCRTSs) located off the coast.[206] Another option is to hold patients at the APOD, until US Air Force fixed-wing assets can land at the airfield. Once a fixed wing assets lands at the APOD, the medical element will coordinate with the USAF AELT to evacuate patients to a STRAT FOB/FOL for a higher level of care. Operation Uphold Democracy provided an excellent example of land forces using PCRTSs/hospitals ships of the coast of Haiti for Level 3 medical care or as in the case of the US invasion of Panama utilizing FSTs to stabilize patients before evacuation to a higher level of care. [207] In this vignette, Level 3 MTFs will position at STRAT FOBs/FOLs to provide the appropriate level of care and if then need requires will forward deployed an element of the MTFs to support the AO.

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[204] Lesson learned from OEF.

[205] The MARDIV will consist of an FSSG with a medical battalion with an H&S Company, with eight shock trauma platoons (STPs), and three surgical companies (Surgical Co). These elements provide initial resuscitative care for casualties. The battalion structure consists of 260 holding beds and 9 operating rooms. The 8 STPs that have 10 patient holding beds each while the Surgical Company contains 60 beds and 3 operating rooms. Headquarters, United States Marine Corps. HSS Operations, Marine Corp Warfighting Publication (MCWP) 4-11.1. Washington, DC: March 10, 1998, 3-3 to 3-6.

[206] ODS & OIF. CRTSs have the largest medical capability of any amphibious ship in the ATF. The PCRTSs medical spaces include operating rooms, an intensive care unit, and a quiet room, with ward and overflow beds. Dental spaces include general dental operating rooms, a maxillofacial surgery operating room, and a prosthetics lab. The delivery of casualties is via helicopter and surface craft. ATF ships suitable for CRTSs are amphibious assault ship (multipurpose) - LHD, amphibious assault ship (general purpose) - LHA, and amphibious transport dock – LPH. Fleet Hospitals are also an option, but currently not very mobile once established. Hospital Ships (T-AH) is a floating surgical hospital and an option in providing Level 3 care, MCWP 4-11.1, 3-11 to 3-12 & USMC, Amphibious Ships and Landing Craft Data Book, MCRP 3-31B.

[207] FOB operations and OEF.

The ability to provide far forward care will be critical in saving lives on this futuristic battlefield. Medical support in the initial phase will be limited due to the amount of medical equipment and supplies to include transportation available to support the initial entry. In fact, first responders will be the primary means of medical support in the early stages of the operation; and will consist of self-aid/buddy-aid, combat lifesavers and combat medics within the infantry platoons. The aid station will arrive next and provide limited Level 1 care. They will potentially have to man-carry enough medical equipment and supplies to provide EMT and ATM. In terms of evacuation, if unable to insert evacuation vehicles, the evacuation of patients will be to Joint Casualty Collection Points (JCCPs) or BASs by designated litter bearer teams. It is also worth noting that litter bearers will provide medical evacuation from the BAS; they will also be the primary means of initial medical resupply. However, once the ambulances are on the ground, the ambulance would then become the primary means of evacuation from the BAS to Level 2 MTFs. The bottom line is that mobility will be a key issue and will prevent the Level 1 medical elements from providing their normal care. Units will have to carry most of their medical supplies and equipment, thus reducing the ability of providing far forward care. However, once the PODs are relatively secure, follow-on forces medical elements will help to enhance the AO's medical support.

A tremendous challenge facing this operation will be providing medical command, control, communications, computers and intelligence (C4I) for the initial entry. The overall operation must be a Joint Operation in nature. There must be proper integration and synchronization of Joint medical assets, from point of injury to the highest levels of care. Depending on the mission at hand and the required capability to support that mission (*Joint and Service*), rapid identification of medical assets should occur and positioned to best support the operation. Another key to success is that service cultural biases and obstacles must be alleviated to ensure effective and efficient medical support. We must possess a mentality of *"One Team, One Fight"* concept when medically supporting missions in the future.[208] There

[208] OIF, OEF, ODS, Operation Provide Comfort (OPC) and OJC Overview & 4250. Current doctrine depicts the importance of continuous synchronization and comprehensive planning. It also highlights the need for

must also be a centralized joint command and control element that can plan and integrate all elements of the medical functional areas to ensure support occurs at the right place and time. A forward command and control element must also be able to deploy in order to properly synchronize and coordinate operations occurring in theater. More importantly, medical assets supporting this operation must possess the communications and automation capabilities to effectively communicate within the medical functional areas to include their own forces; it must also include any joint and interagency assets.[209] Medical C4I is an area in which the AMEDD has seen historical problems and deficiencies; this area must be resolved in order to provide effective medical C4I in the future.[210]

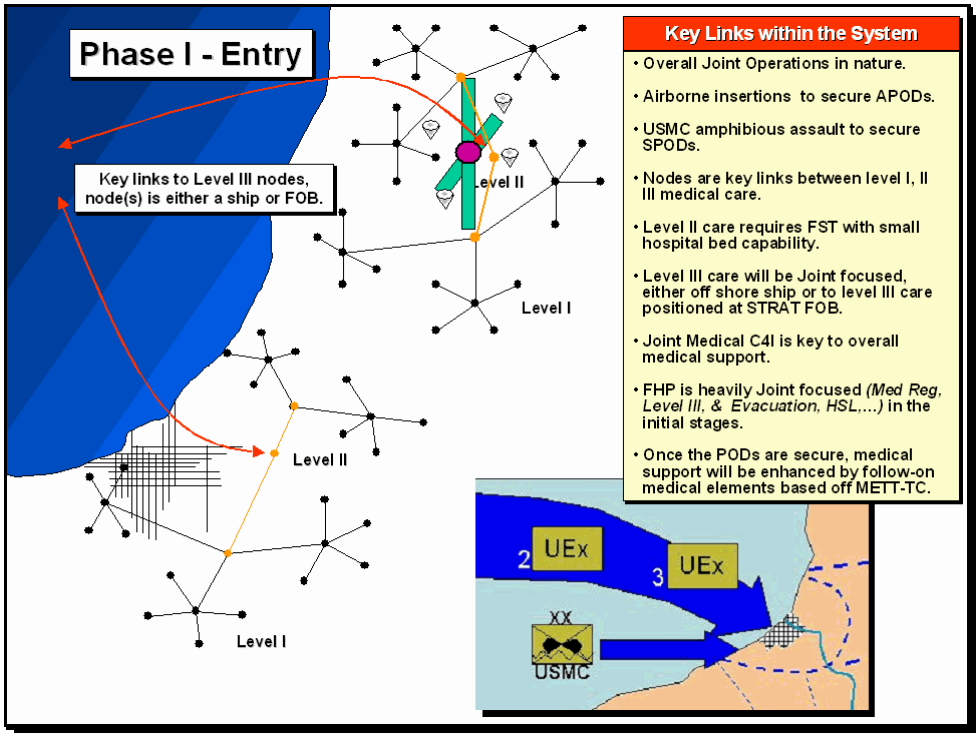

Figure 8-The Initial Phase of the Operation-Force Entry

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the best-qualified individual to include the selection and placement in key leadership positions, FM 4-02, FHPGE, 3-1 to 3-2.

[209] The evolution of MC4/TMIP and its C2 capabilities of collecting medical information are vital in future operations. The information that medical units receive through TMIP helps to generate and publish plans and orders. The program enables the assessment of personnel medical status to include the readiness and capabilities of the medical units in an operational environment. It links medical organizations, to include joint services, and enables rapid decision-making on the medical functional in specific medical C4I.

[210] ODS 3201, 3700, 3751, 4330 and 4351.

Theater hospitalization presents another substantial obstacle when considering options to medically support the initial entry. Normally, in the initial stages of this type of operation a Level 3 MTF may not be available. When considering a possible option to support the initial entry, one may want to consider the integration of surgical care to include minimal hospital beds with forward medical companies. This would only provide limited support based off the number of anticipated casualties at that level of care.[211] Another option would be to use PCRTSs located off coast; however, based off space available the PCRTS may not always be available to support a military operation. Another consideration would be the establishment of a Level 3 MTF at STRAT FOBs/FOLs located throughout the Joint Operational Area (JOA). Then from the FOBs/FOLs incrementally flow Level 3 assets into theater once the situation allows for the entry of these medical assets.[212] On a positive note, the FM 4-02, *Force Health Protection in a Global Environment*, states the need for a modular and easily tailorable hospital that could deploy as functional modules. More importantly, the functional modules will allow the hospital, based on the requirement, to operate incrementally. Even though some Combat Support Hospitals (CSHs) offer echeloned capabilities, the US Army does not truly posses MTFs with equipment and personnel capable of effectively performing echeloned medical support.[213]

Medical planners must also ensure the synchronization of medical supplies to support the initial entry. Historically, HSL tends to be significant issue that plagues the force.[214] An option to mitigate the risk is to ensure Joint integration of HSL assets to support the initial entry, to cross level medical supplies and plan for the delivery of medical supplies by airdrops or airland from supporting FOBs/FOLs. Other

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[211] OEF, OIF, and Panama Medical Lessons Learned. The developing AMEDD concept of FASH or FSH would also help in supporting the initial entry of a UA, U.S. Department of Defense, *Joint Publication 4.02, Doctrine for Health Service Support in Joint Operations,* (U.S. Government Printing Office, Washington, D.C., 30 July 2001), vi.

[212] John R. Anderson. *Transforming EUCOM, Part 1: Plan could shift leaner units closer to hot spots.* Stars and Stripes published January 23, 2005. Retrieved January 23 2005 from Stars and Strips Web site: http://www.estripes.com/article.asp?section=&article=15472&archive=truem

[213] The initial element would most likely include an operating room (OR) module, intensive care module, evacuation liaison, and limited diagnostic capability (x-ray and laboratory services). As the theater matures and lift is available for follow-on modules, the HSS commander would deploy these elements in the appropriate number and mix to accomplish the mission. The breakout element allows the theater hospital to be employed and function in a split-based mode, FM 4-02, Force Protection in a Global Environment, 1-3.

[214] OJC 4238.

options are to coordinate HSL with US Navy or US Air Force to deliver medical supplies until US Army HSL elements arrive in theater.[215] Whatever the case, HSL planner must be at the planning table to ensure key nodes across the JOA are established to facilitate medical support. They also must stay involved in the planning to ensure early entry of HSL elements to support forces deploying into theater.[216] Another key issue is that a HSL requires a dependable automation system, which allows joint interface. The system must possess the appropriate bandwidth to submit and receive large files. The HSL system must provide an effective means of tracking medical supplies and gives the operational unit the visibility to obtain a requisition status on medical supplies.

Medical Regulation and the evacuation of patients will present potential problems. Historically, the DOD iterates the need for a Joint medical tracking system that provides automated entry of patients at POI, through the Levels of Care all away back to Level 5 MTFs in CONUS. The system must allow for Joint interface across the battlefield and helps MROs to determine status and capabilities of hospital within theater. [217] This system would potentially help in the Joint integration of all services and would facilitate the evacuation of patients for inter- and intra-theater operations.[218] There must also be full synchronization of evacuation assets to best support the theater. This synchronization must incorporate all services and include both standard and non-standard evacuation platforms. Failure to synchronize all

[215] Medical supplies and equipment for the MEF are managed through the medical logistics company (Med Log Co), supply battalion, which issues the authorized medical allowance list (AMAL) and authorized dental allowance list (ADAL) and handles resupply issues. When the Med Log Co or detachment does not deploy with the CSSE, the CSSE supply detachment and/or inter-Service support agreement provides resupply support. Of special note, the AMAL/ADAL can provide medical supplies to the MEF for 60 days if required, MCWP 4-11.1, 3-4 and 4-1 to 4-8. To ensure contingencies for medical resupply, medical planners must consider other services means of medical resupply and support, even though the US Army is tasked as the single integrated medical logistics manager (SIMLM) other options may need consideration to best support the theater prior to the arrival of US Army HSL elements.

[216] OJC 4238.

[217] Spurgeon, 174-175 and OJC 4241 & 4130.

[218] In the future portable information carrier (PIC) will be able to store personal medical information about its owner and will play a significant role across the range of medical operations. The PIC is a hand-carried, abridged electronic medical record, which will serve as the primary repository of individual readiness data such as deployability status, casualty prevention training, medical history, and demographic information. This technology will give the care provider electronic read/write capability to record care given to the patient. This technology will also enhance combat casualty care and patient tracking capability by interfacing with command and control systems (MC4) to track patients' movement, assess logistics requirements, and manage medical surveillance, MCWP 4-11.1, 10-4.

services assets can jeopardize the ability to effectively and rapidly clear casualties, and will result in numerous deaths on the futuristic battlefields.[219]

Phase II – Buildup

In this phase of the operation, forces of the UEy will begin their rapid buildup in order to launch decisive operations into B-land. The Operational Concept for Forced Entry states that in the future, a forced entry operation will receive support from a Strategic Response Sustainment Brigade (SRSB). This is a consolidation of the DISCOM and Corps assets and provides distribution-based of replenishment to units under the operational control of the UEx; also back up direct support to the BSBs, and area support to any other unit. The concept focuses on the SRSB providing RSOI functions as well as supporting future combat operations from the APOD/SPOD; it is also able to provide logistical support to maneuver brigades during replenishment operations. The uniqueness of the SRSB is its ability to sustain Forced Entry operations in an immature, austere, and undeveloped theater. The element is a stand alone, self sufficient and expeditionary force with the capability to conduct CSS reach-back directly to the national (strategic) level and eliminates the need for pre-established theater logistics structures. The UEx SRSB would also consist of Medical Plugs from UEy, which would assist in providing medical support to an AO.[220]

Medical assets in the future, as well as the other sustainment areas, will need to focus on eliminating stockpiles and static inventories, substituting speed for mass when deploying assets. Through medical C4I, command and control will need to achieve situational understanding. This situational understanding will allow decision makers to properly position their elements throughout the theater of operations. With an increased velocity, medical units will be able to reduce both their organizational and material layering in forward areas. In the future, the focus of medical C4I will be controlling the

[219] OIF.

[220] Operational Concept for the Forcible Entry UEx (DISCOM Revised). The 82nd Airborne Division, Fort Bragg, NC. 31 August 2004

destination, speed, and volume of the support and distribution system. Much like the logisticians, the AMEDD must focus on automation systems that allow in-transit visibility (ITV), total asset visibility (TAV), advanced materiel management, and advanced decision support system technology. With this total visibility, medical C2 will have knowledge over all units and items within the support and distribution pipeline. More importantly, the visibility will allow medical decision makers to redirect, cross-level, and mass assets to support the maneuver commander's intent.

In this operation, possible *Medical Plugs* to support the build up of forces would potentially consist of additional Medical C4I elements, Area Treatment assets, PVNTMED, an early entry Level 3 MTF, HSL elements to include ground and air MEDEVAC elements. The task and purpose of these elements would be to provide medical support for the build up while simultaneously preparing the force for phase III decisive operations. By obtaining situational understanding, decision makers will be able to decide based on METT-TC what elements need to first arrive in theater. What are some of the potential obstacles or issues found in this phase?

Historically, medical units have had difficulty-integrating units into the force flow. In the past, the delay of medical units often occurred due to the commander's decision to balance *"maneuver versus support"* requirements. Medical unit's structure must change to a highly mobile and adaptable force, which are not logistical intensive, but can still manage to effectively support the AO. [221] Historically, medical units have often taken lengthy periods to become operational or deploy due to logistics and support requirements.[222] Again, medical units must change their structure to be able to meet the demands of the mission. Medical decision makers must also change their ways of thinking and create flexible and adaptable minds, which are able to understand the situation at hand, and adjust to meet potential demands. They must understand the Common Operating Picture (COP) and how to prioritize the flow of medical assets. Certain missions may require the inspection and establishment of bed down areas and work places, establishment of food contracts, while simultaneously requiring medical support and supplies for the AO.

[221] ODS 4103 and 3930, OIF and OEF Medical Lessons Learned.
[222] ODS and OIF Medical Lessons Learned.

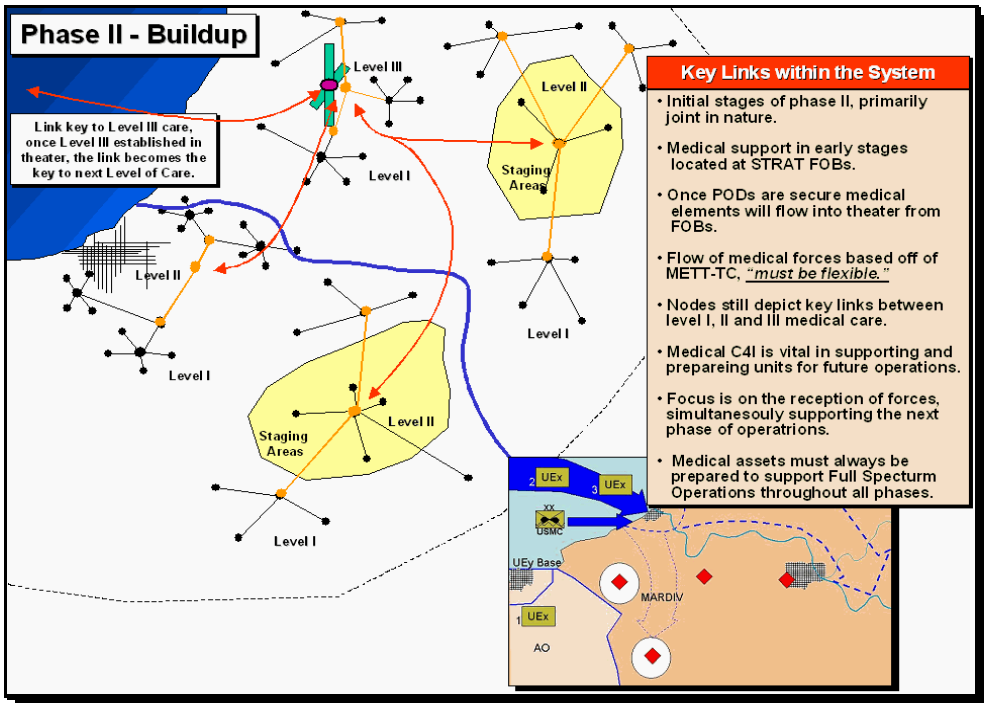

Figure 9-The Second Phase of the Operation - Buildup

As medical unit's entry the AO, they will need to be adept in dealing with civil affairs issues to include working with international organizations.[223] The world may very well find itself saddled with maintaining *"welfare states"* in a variety of failed nations, if the case, the US Forces may play a key role in providing support humanitarian assistance, security, protection, and deterrence. This operational environment will have a high level of uncertainty and once on the ground medical forces will need flexibility to adapt to unexpected situations. Events such as Weapons of Mass Destruction (WMD), support to Displaced Personnel (DPs) and HA, conducting health assessments within theater operations and the potential of providing medical support to Enemy Prisoners of War (EPW).[224] Figure 10 depicts the general operational environment US Forces will face in future deployments. Force protection will also be crucial for medical units in this operational environment. The JOE states that in this failed or failing entities, **"**Terrorists and criminals will also be active, ready to exploit the situation for their respective

[223] OJC, OPC, OUD, and Balkans Medical Lessons Learned.
[224] ODS, OIF, OJC, OUD, Hurricane Andrew and Mitch Medical Lessons Learned.

gains. US Forces, combined with law enforcement and intelligence activities in a collaborative information environment, will have to deal both with enemy military forces and other non-traditional forces, such as criminal organizations, terrorists, or religious fanatics, who will seek to profit from instability."[225] Medical units will need the capabilities to deal with these threats to include the threat of insurgents operating along our LOCs and near our support areas.

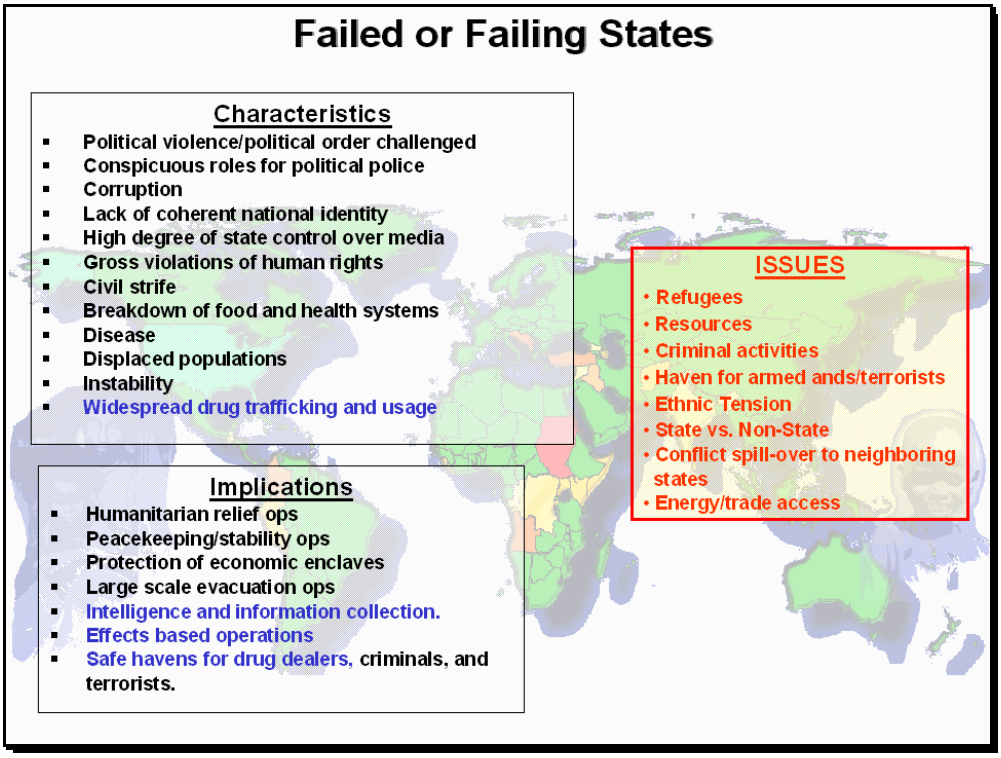

Figure 10-Failed or Failing States the Future Operational Environment[226]

Possible option to mitigate this risk is using STRAT FOBs/FOLs throughout the JOA. At those locations, medical units would establish and provide support to the theater. This would help keep the medical footprint in theater to a minimum. Forward elements would only consist of the bare minimum to support the operation on the ground. While additional medical support located at the FOB/FOL would "*push*" medical support and supplies based off the requirements to support the force in theater. If there were no requirement for the element then the element would redeploy or "*pull*" back to the FOBs/FOLs.

[225] USJFCOM, Joint Operational Environment (JOE), 35.
[226] Ibid., 34.

At the FOB/FOL, the element would then wait until there is need for a specific requirement in the follow on phases.

Phase III – Decisive Action

Medical elements will potentially face numerous issues in supporting the decisive phase of the operation. The first responders providing far forward care to include rapid evacuation and surgical stabilization will be crucial in *"Conserving the Fighting Strength."* Medical elements need to possess the mobility to position and reposition when required by the tactical commander. Joint Medical C4I will still be crucial in synchronizing and monitoring to include the repositioning of medical support and supplies to best support the mission of the tactical commander.

Far forward care will be essential on the futuristic battlefield. With the extended LOCs and dispersion of units, the basic medical skills taught to our soldiers in self-aid and buddy-aid, to include the training of combat lifesavers and combat medics will be vital on tomorrow's battlefields.[227] Historical data reflects that 66% of deaths in combat occur immediately or within five minutes of injury, and another 15% within thirty minutes. According to Trunkey, about 90% of the deaths will occur before the casualty arrives at a medical treatment facility. See figure 12, Trunkey Tri-modal Distribution of Casualty Deaths on the Battlefield. Historical data also states that 38 % of KIA could have been prevented by self-aid or buddy-aid, this means by applying either a field dressing or tourniquet, or by establishing an unobstructed airway, an injured soldier would have survived. This also means that on the future battlefields of tomorrow, there must be a major improvement related to battlefield treatment, especially in terms of stopping the hemorrhaging.[228]

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[227] Mosebar, Robert H. *"Fifty-year AMEDD veteran offers valuable lessons learned,"* The Mercury, U.S. Army Medical Command, Fort Sam Houston, Texas, June 1996, 6-7.

[228] In the Israeli invasion of Lebanon in 1982, units that had received extra first aid training suffered significantly less mortality and morbidity from wounds, Holmes, 193-195. Historical figures used in monograph were from Vietnam, Bellamy.

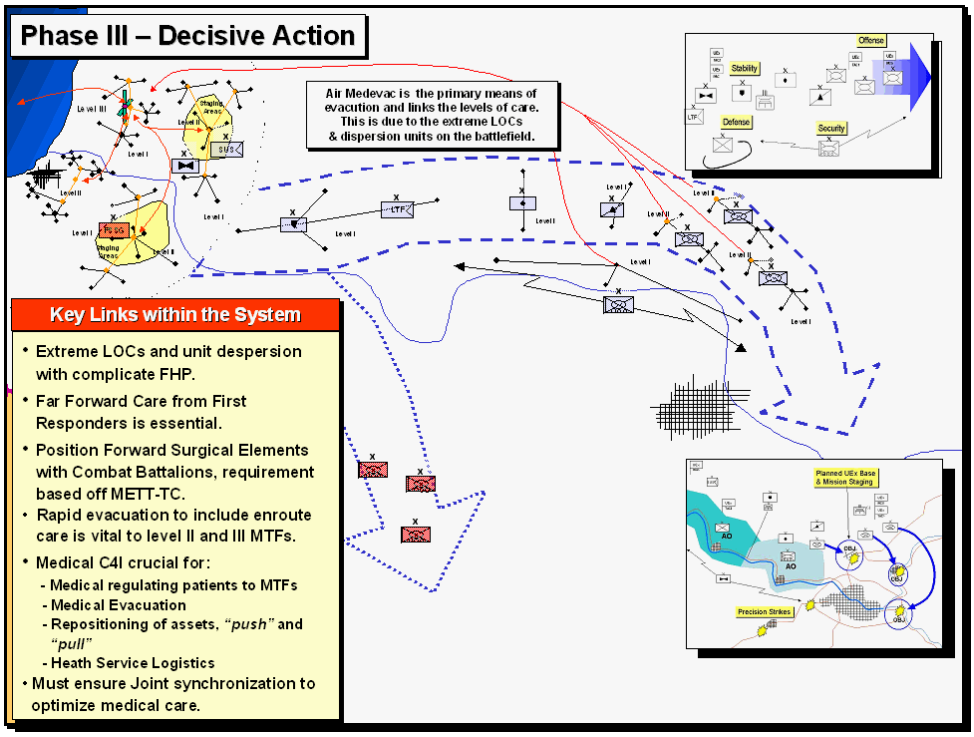

Figure 11-Decisive Phase of the Operation

In terms of Level 1 care, experience since 1940 shows that about 75% of severely wounded soldiers will survive eight hours of evacuation to the first surgery, only if ATLS is performed early. The problem is that 25% of them will die, usually of ongoing hemorrhage, hypoxia from lung injury, or brain swelling. If a delay exists and goes past eight hours after wounding, then the death rate will likely to increase in those 75% that received ATLS care.[229] The bottom-line is unless a casualty receives ATLS within the first hour, many casualties will not survive until surgery, even if they receive adequate self/buddy aid.[230]

[229] Wolcott, 30-31.
[230] Ibid., 21.

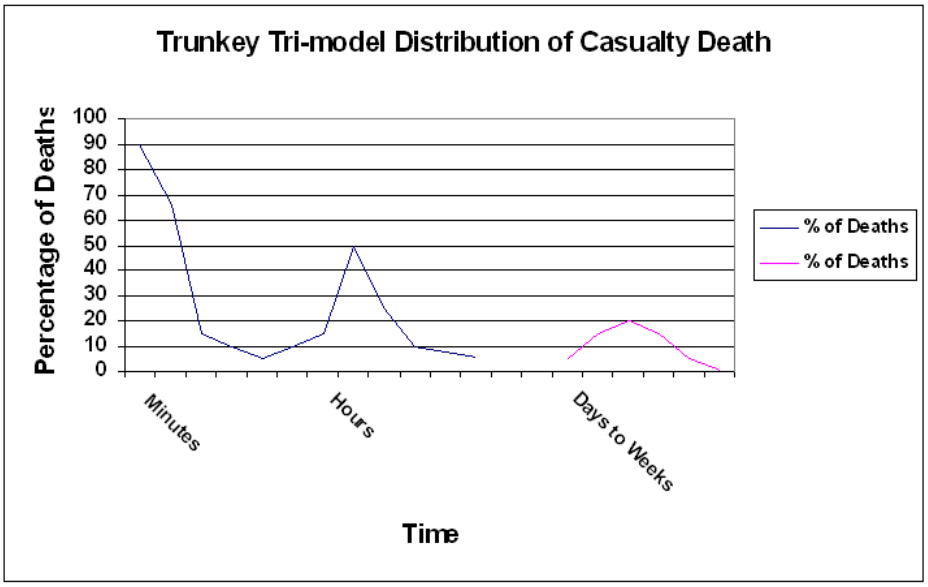

Figure 12-Trunkey Tri model Distribution of Casualty Death[231]

This means that on futuristic battlefields, prompt evacuation will be crucial for severely injured soldiers who would otherwise die between 30 minutes and six hours of wounding, and to prevent prolonged shock, which is usually implicated in late deaths due to multiple organ failure and sepsis.[232] In the tri-modal distribution of severity, about 4—50% of combat casualties will be minor injuries, with approximately 25-35% falling into the category of medium severity. It is also worth mentioning that some of the medium severity casualties will require surgical treatment for recovery. The greatest concern will be the 20-25%, which will be categorized as severely injured, and will all die without prompt treatment.[233] This also highlights the *"Principle of Selectivity"* on the future battlefields, which means treating the minimally injured but rapidly evacuating the severely injured from the battle area.[234]

Currently, the US Army uses helicopters to rapidly evacuate casualties from the battlefield. Weather, speed and range often limit the performance of these assets. Without auxiliary fuel pods, the

[231] Trunkey DD. "Trauma." Scientific American 249, no. 2 (1983): 20-7
[232] Bellamy, 16-17.
[233] Ibid., 26-28.
[234] Wolcott, 26-27.

helicopter has combat radius of less than 200 miles. The current MEDEVAC helicopter model receives upgrades to enhance monitoring and en route treatment. With fuel pods, the helicopter has a radius of 450 miles; however, *is this piece of equipment the best asset for the forces in the future?*[235] The U.S. Marine Corps currently possesses the MV-22 *"Osprey"* tilt-rotor aircraft; it is a vertical take-off aircraft, which can carry larger payloads than helicopters. It cruising speed exceeds 250 knots and possess a combat radius exceeds 200 nautical miles.[236] However, by 2025 most of these systems will need phasing to a newer more efficient system. Evacuation in 2025 will also require the means to provide en route treatment due to the extended distances. There will also be a need for improvised litters that can assist in the monitoring and treatment of patients; the US Army currently possess these items but are too heavy for battlefield use.

The dispersed and fluid battlefield of the future will require lightweight, small, very mobile medical facilities with extensive digital information capability. These forward medical treatment units should be as close to combat action as the tactical situation allows. They will often locate within a few kilometers of the battle, allowing prompt surgical resuscitation to stabilize the patient for further evacuation.[237] The FST will be the first level of surgical capability that the casualty receives following treatment from first responder. The team will be organic to the unit of action as part of the support unit's medical company and should possess the essentials for surgery such as oxygen, blood and anesthesia. Additionally, the teams will possess filmless digital imaging systems which will allow for field X-rays at the FST level of care. The Dental Field Treatment and Operating System should be able to provide for initial stabilization of maxillofacial injuries and allow forward management of dental emergencies. The team will also possess lighter and leaner oxygen generators, which will reduce the major logistics burden associated with transporting pressurized oxygen gas cylinders. Blood sterilization will also provide

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[235] Harry D. Scott, Jr., Assistant Chief of Staff, G3, 101st Airborne Division (Air Assault), *"Division Capabilities Guide,"* memorandum for commanders and staffs, Fort Campbell, KY, 18 June 1999.

[236] Federation of American Scientist. *US Military Weapons System, Rotary, V-22*. Retrieved October 15, 2004 from the FAS Military Analysis Network web site: http://www.fas.org/man/dod-101/sys/ac/v-22.htm

[237] Board on Army Science and Technology, Commission on Engineering and Technical Systems, National Research Council, 33-36.

practical blood donation in the field, reducing the logistics burden associated with relying on stored refrigerated blood.[238]

In terms of Level 3 MTFs, the current force does not possess the capability nor adequate mobility or flexibility for decisive operations nor accommodates FSOs below Corps level. However, the AMEDD is currently working two courses of action that attempt to resolve the previously mentioned deficiencies. One possible course of action includes the use a Forward Army Surgical Hospital (FASH), which encompasses the existing FST as the core building block and adds augmentation modules as needed.[239] The current concept is the FASH would consist of three variations of which could deploy based on mission requirements. The variations include a 10-bed FASH, 20-bed FASH, and 20-bed FASH with additional operating room (OR) capabilities. The FASH would have the ability to provide various ancillary services such as lab, x-ray, and maintenance, and a 10-bed FASH which would add to a already 10 bed Intensive Care Unit (ICU) FST structure. This would help in enabling a holding capability for critically injured and ill patients, which normally require continuous care. The 20-bed module adds another 10 bed ICU to expand holding capability. Operating room (OR) augmentation would also enable the FASH to conduct sustained operations 24-hours a day. A third variation of the FASH would add another FST, doubling the surgical capability.[240]

The second possible COA is the design and employment of a Forward Surgical Hospital (FSH). The intent of this concept is to develop a small, surgically intensive, highly mobile hospital that would provide early-entry basic Level 3 hospitalization far forward care on the battlefield and which can expand

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[238] Wildzunas, Robert M. Ph.D. and Feister, Alan J. Ph.D. Medical Technologies for the Objective Force, *"Supporting the warfighter with the best medical care."* Military Medical Technology. Retrieved August 1, 2004 from http://www.military-information-technology.com/index.cfm

[239] The historical case studies demonstrated that the FST possesses desirable mobility and has become the organization of choice for recent deployments. The incidence of non-doctrinal employment of the FST indicates that while the mobility is desirable, shortfalls exist in its capability, Lodi, Paula C. *The Army Medical Department and Full Spectrum Operations.* United States Army Command and General Staff College, School of Advanced Military Studies. Fort Leavenworth, KS: 2002, 39.

[240] Lodi, 39-40.

as the mission requires.[241] There are two variations of the FSH, a 10-bed and a 20-bed hospital. The capabilities of these organizations mirror the 10 and 20-bed increments of the FASH.[242] Nevertheless, the variations to this organization would provide a planner the maximum flexibility to adjust forces once deployed. Both systems would also allow for quick adaptability within theater based on changes to the operation or situation without compromising the readiness of other organizations; these are assets both worth having on the Battlefield of 2025.

As previously mentioned, Joint Medical C4I will be vital in the planning and execution of future medical support; more importantly, Medical C4I will need an automation/informational system to achieve total situational knowledge and understanding. The system must allow the Joint Medical Commanders to effectively plan and to ensure the right capability is at the right place at the right time. This will also allow us to eliminate redundancy in the joint medical systems.

Phase IV – Transition to Protracted Stability

Transitioning from combat to Support Operations and Stability Operations (SOSO), and back, creates challenges in the forces medical capability, flexibility and rules of engagement.[243] Historically, there has always been a quick and unexpected shift from combat to support operations. These types of situations occurred in Panama, Operation Desert Storm, and Somalia and currently in Operation Iraqi Freedom.[244] Nevertheless, as medical support transitions from Decisive Operations to SOSO, there are certain trends that tend to emerge. The consistent trends include the presence of refugee or displaced populations; often there is a humanitarian piece related to the operation and normally there is a lack of host nation medical infrastructure. There must also be a determination in what level of medical support the US will provide to a multinational force. Usually, there are differences between the medical readiness

[241] Both concepts requires that the organization be C130 deployable, 100% tactically mobile using organic equipment and provide required support for 7 days without resupply. This concept specifically aims to leverage technology to reduce weight and cube enhancing strategic and operational mobility, Lodi.

[242] Lodi, 40.

[243] Center for Healthcare Education and Studies, 17-22.

[244] OJC 4239.

amongst coalition troops and a degree of variability in coalition partners' medical assets. Because of these historical but consistent trends, the future operational environment will also present a broad range of requirements, requiring a high degree of flexibility in medical planning and resourcing of a supported mission.[245]

Even though there is limited discussion in terms of SOSO, there must be an assumption, based off historical data, that both internal and external pressures the medical requirements within this vignette will expand-- *"mission creep."* In SOSO environment, the demands for services are often open-ended and possess the potential of consuming large amounts of medical resources. Historically, there are consistent factors that contribute to the increase of medical missions. The increase of coalition partners normally increases the medical requirements; in which there are normally increased demands induced by the United States National Security Council, Department of State (DOS) or other outside requests and influences, such as the United Nations, in response to ethical and professional considerations. Nevertheless, these increased demands, often increases the medical missions and workload within the AO.[246]

In these instances, the Joint Medical command must clarify, in the initial stages of operations, what requirements are needed in the overall medical mission, its objectives, desired end state, and classes of patients eligible for services. There must also be a defined limit in treating civilians. The Joint Medical command must also address repatriation problems by establishing procedures for evacuating coalition patients, to include displaced personnel, to facilities in their home countries or local hospitals; there must also be better coordination, understanding of intergovernmental, and non-government agencies to assist in providing healthcare.[247]

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[245] Davis, Lois M., Hosek, Susan D., Tate, Michael G., Perry, Mark, Hepler, Gerard, and Steinberg, Paul S. Army Medical Support for Peace Operations and Humanitarian Assistance. Published by RAND Corporation, Washington, DC: 1996, Summary, 4.

[246] Ibid., 5-6.

[247] Ibid., 6-7.

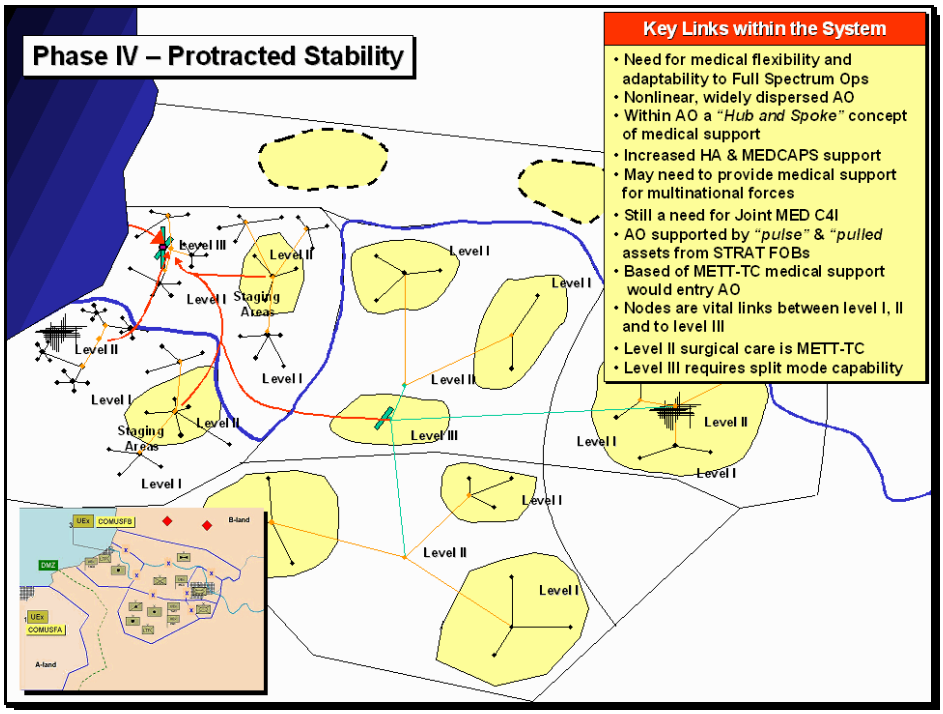

Figure 13-Protracted Stability Phase of the UEy Vignette

In terms of planning, planners need to consider not only the medical requirements for supporting a deploying force, but also the broader missions the Army may be assigned in SOSO. For example, in operations involving HA or refugee populations, the medical mission is likely to be broader than the basic workload of supporting the deploying force. In fact, the real thrust of the AMEDD's workload may be to provide health support to the host nation. Yet, planners continue to view the medical mission as limited to its traditional combat service support role. This in turn leads to a medical force not only supporting the force but also supporting unanticipated requirements.[248]

To mitigate this risk, the Joint Medical Commander must conduct medical assessments to determine SOSO requirements. The assessment should explicitly consider the at-risk population and

[248] Ibid., 8.

categories of patients to include host-nation structure and capabilities. The assessment must also focus on any specific medical requirements related to civilian populations and/or multinational forces.[249]

In general, SOSO entails a broader set of demands upon the medical component. Planning for future SOSO missions needs to recognize the breadth of such demands, especially in multinational operations and plan for the broad range of missions that medical units will be required to take in SOSO. The demand for medical services in SOSO will differ from that in combat operations. These differences also mean that the AMEDD may be called upon to provide a broader range of services (including pediatric and OB/GYN care) in these operations and must be prepared to treat certain infectious diseases and chronic medical conditions not common among U.S. forces. Thus, in SOSO the demand for medical services is often closer to what a community hospital would face, compared to a military hospital in support of combat operations, which normally focuses toward trauma and emergency care. Many of the SOSO missions will have a humanitarian component, including public health actions or prevention (e.g., ensuring the quality of the local water supply to prevent the spread of cholera and other water borne diseases, or establishing basic sanitation conditions within a refugee camp or community hospital). In such situations, the Army may find itself providing medical supplies, community health services, public health education, training, and even basic equipment to shore up the local medical infrastructure. Although SOSO requires a broader range of services, patient demand tends to be relatively low. The size of the hospital required is often small (averaging 60 beds and 120-140 medical staff in recent OOTW).[250] However, Somalia provided an excellent example of how a MTF could be quickly overwhelmed under a

[249] *Medical Support for Peace Operations and Humanitarian Assistance* states coalition troops normally have poor preventive medicine measures and healthcare, and as a result, the US Level III MTFs will receive an increase level than anticipated, often complicating the use of resources. In addition, in a SOSO environment, US military is normally tasked to provide care to civilians--not only local people, but refugees, UN and NATO employees, and coalition soldiers--whether or not it is part of the official medical mission, 8.

[250] Ibid., 5.

mass-casualty situation. A key lesson from that operation is to ensure flexibility is within the plan and that it helps to facilitate medical support in a FSO.[251]

To meet the future challenges of SASO, the AMEDD must also focus on transformation of medical units and of its doctrine. In transformation of medical units, they must change to an adaptable yet medically efficient support system that supports the FSO.[252] There must also be a creation of doctrine, which focuses on HA or natural disaster missions. The medical units must be modular and tailorable to meet the demands of SOSO; capable of dealing potentially contagious diseases; an extended preventive medicine and physical therapy services, as well as limited rehabilitative capabilities to treat land mine injuries and sports-related injuries (both common in SOSO).[253]

The AMEDD must also consider medical teams that can surge its capabilities and either handle or quickly evacuate casualties in a mass-casualty situation; missions that would normally overwhelm MTFs. Historical lessons depict the need for special-purpose support packages for geriatric, gynecological, and pediatric care. Planners must identify and preposition HSL packages at possible STRAT FOBs/FOLs and when needed within the AO delivered by airdrop or air land.[254] Another historical note is the use and consideration of TELEMED. Even though the historical trends may not reflect the system in a positive light, it still has tremendous value in future operations and will help to reduce the amount of specialties needed within an AO. This automation system allows various medical specialties to be brought to a theater of operations to treat a full range of diseases and medical conditions encountered in a operational environment, which under current conditions may be prohibited due deployment CAPs.[255]

[251] There is a tendency that MTFs may easily be overwhelmed in a mass-casualty situations and that medical evacuation will become a top priority. For instance, Somalia was an example of the AMEDD doing its combat mission in an OOTW environment; patient demand was relatively low, characterized by peaks and valleys yet always with the potential for combat, Ibid., 5.

[252] ODS 3141.

[253] Medical Support for Peace Operations and Humanitarian Assistance, 7.

[254] OJC 4239, ODS 3930 and 4103.

[255] Medical Support for Peace Operations and Humanitarian Assistance, 7.

CHAPTER IV

Recommendations & Conclusion

In the DOTLMP-F format, this chapter will discuss the recommended changes that need to occur in order to transform to support the Army's Future Force in 2025. These changes consist of medical concepts and systems that will need resolution in order to transform to support the Army's Future Force in 2025. It is also the intent that the US AMEDD finds the recommendations beneficial and thus translates the findings into either programming guidance or plans of action that may best support the Future Force. Table 5, *The Past and the Potential Future Trends of Force Health Protection*, depicts the past trends since the Vietnam War and potential issues that the US AMEDD will face as it transforms its medical force to support operations in the contemporary environment. These trends in Table 5 also help to establish a common framework of historic and modern-day issues discussed in chapters two and three of this monograph.

Doctrine

The current doctrine in FM 4-02 highlights that future Joint HSS will concentrate on shifting its focus from *definitive care* to providing *essential care* within a theater of operations. It also highlights the importance of far forward medical care with rapid evacuation to surgical entity. As a change from the past, HSS within a theater will consist of surgical treatment to stabilize the patient, followed by rapid evacuation of the patient to a definitive care facility located in either CONUS or another safe haven. Another key concentration is that Joint HSS will not focus on returning soldiers to duty within theater and because of this decision will help to reduce the medical footprint within a theater of operations. However, these two underlying assumptions will instead increase the effort and focus of timely medical evacuation of patients from a theater of operation.[256] This newly published doctrine is a positive change. The new

[256] FM 4-02, Force Health Protection in a Global Environment, 1-1.

doctrine also attempts to address medical care under a FSO all while under the support of the Joint health services; another positive change as the US AMEDD begins its transformation to support the US Army in the 21st Century.

In terms of Levels of Care, Level 1 care in the future must focus on the integration of technology in order to provide *first responders,* to include self-aid, buddy-aid and combat lifesavers the means to rapidly acquire, assess and treat casualties on the battlefield.[257] However, the combat medic will also need to have total situational awareness of the soldiers they are supporting; and highly trained in their skills to sufficiently support FSO. The Level 1 MTF will remain focused on providing emergency medical treatment (immediate far forward care) with an aid station or treatment team. However, due to the possible distances between Battalion Aid Stations (BASs) and the Brigade Support Medical Company (BSMC), we might consider a change within our doctrine. For instance, the FSTs in the future must have the potential to conduct spit-based operations. Based off mission, the FST could conduct split-based operations with its base located at the BSMC while the FSE would position forward to provide surgical care to a battalion aid stations.[258] The rationale is that the extreme distances between the combined arms battalion and the BSMC FST could require far forward surgical care to prevent an increase in the fatality rates.[259]

At Level 2, the MTF must be a fully functional and flexible medical element that can adapt to ongoing or simultaneous FSO. As defined in FM 4-02, *Force Health Protection in a Global Environment,* Hospitalization is a part of the theater-wide HSS system for managing sick, injured, and wounded

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[257] MIT Institute for Soldier Nanotechnologies (Producer). (2004). *Enhancing Soldier Survivability*. [Video]. Retrieved July 19, 2004, from MIT Institute for Soldier Nanotechnologies Web site: http://web.mit.edu/smcs/ isn/rm-500-ISNOverview.ram

[258] Headquarters, United States Marine Corps. *HSS Operations*. Marine Corp Warfighting Publication (MCWP) 4-11.1. Washington, DC: March 10, 1998. This would be similar to the FRSS of the USMC. Dingle, Raymond S. Force Health Protection for the Objective Force. United States Army Command and General Staff College, School of Advanced Military Studies. Fort Leavenworth, KS: April 26, 2002.

[259] OEF showed that the units that lacked far forward surgical care resulted in the deaths of soldiers on the battlefield, OEF 15103. Trauma Systems data also demonstrate that survival after major injury is predicated upon rapid, quality prehospital care, a reliable and rapid evacuation system and surgical intervention within 2-3 hrs of injury. COL Holcomb, John. *OIF 2 Trauma System Issues, Information Brief.* Presented June 1, 2004 at a US Army Trauma Symposium. Acquired from US AMEDD Lessons Learned via email September 13, 2004.

personnel. The term *hospitalization* is used to embrace that portion of health care delivery provided at hospitals on an *inpatient* basis for all classes of patients whose conditions cannot be managed on an *outpatient* or *holding* status.[260] However, there must be the consideration of not only augmenting the medical companies with FSTs, but with providing limited means of hospitalization whenever a mission dictates. The hospitalization package would reinforce a medical company operating in the dispersed operational environment of the 21st Century. Operation Enduring Freedom and Iraqi Freedom highlighted the need for a hospitalization capability either located near or attached to the medical company. The UAs future battlespace will consist of a width and depth of 300km x 300km and due to the dispersion, Level 2 may require hospitalization capabilities to hold patients who are unable to be evacuated to a higher level of care. [261] Potentially this hospitalization capability could also act as an operational element or lead echelon for a Level 3 MTF as the Level 2 facility departs its location and prepares for follow on operations.

Operation Iraqi Freedom highlighted the benefits of having the FSTs; however, as the theater matures and there is less risk within the AO; medical assets would then transition to a more robust Level 3 capability, again based off mission and situation in theater. The reason for the transition is that lessons from OIF state that approximately 74% of injured soldiers go from point of injury or Level 1 care directly to Level 3, often bypassing the FST located at Level 2.[262] This creates an assumption that as the theater matures, there is less of a need for the FST.

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[260] An *inpatient* is a person admitted to and treated within a hospital and who cannot be returned to duty within the same calendar day while, an *outpatient* is a person receiving medical/dental examination and/or treatment from medical personnel and in a status other than being admitted to a hospital. Included in this category are the personnel who are treated and retained (held) in an MTF other than a hospital (such as a Level 2 MTF). By doctrine, a *holding patient* is a person who is treated at Level 2 and is expected to be able to RTD within 72 hours or is being held for further evacuation to the rear, FM 4-02, *Force Health Protection in a Global Environment,* 5-4.

[261] OIF and OEF highlighted the need not only augment the medical company with an FST, but METT-TC dependent, it should be augmented with limited hospitalization capability. A recommendation for a medical company (light) was to turn the 20 patient hold cots into 5 ICU beds, 5 ICW beds, and the remaining 10 cots remain into MCW beds, with a nurse and 2 medics in each, OIF 15282 and OEF 5637.

[262] Holcomb states that approximately 26% of injured soldiers go to level II before reaching Level III, slide 7.

Table 5-The Past and the Potential Future Trends of Force Health Protections[263]

Topic	Past Trends Since the Vietnam War	Future Needs of the AMEDD
Medical Planning	▪ Inadequate casualty estimates (ODS, OIF) ▪ Poor understanding of SASO (Balkans, ODS, OIF, OEF, OJC) to include transitioning to HA (OJC, ODS) ▪ No Doctrine for DSO/HA (Hurricane Andrew & Mitch) ▪ Insufficient Joint and Interagency Coordination and Integration (Hurricane Andrew and Mitch, ODS, OIF, OEF) ▪ Poor understanding of Civil Affairs (OUD, OIF)	▪ A Joint planning system ▪ Joint/interagency understanding and integration ▪ Refocus leader development curriculum (add Jointness)
Medical Command, Control and Communications	▪ Inadequate Medical C4I (OJC, ODS, OIF, OEF, Balkans, Hurricane Andrew & Mitch) ▪ Insufficient communication and information systems (OUD, OUD, Hurricane Mitch and Andrew, OEF, OIF) ▪ Internet not available, must increase bandwidth (OIF, OEF)	▪ Joint Med C4I systems ▪ Voice-activated systems ▪ Advanced sensors
Medical Logistics	▪ Class VIII issues with receiving, storing and distributing (ODS, OUD, OEF, OIF) ▪ Insufficient MED LOG Planning (OJC, OUD, OEF, OIF, Hurricane Mitch and Andrew) ▪ Early positioning of Class VIII nodes (Balkans, OEF, OIF) ▪ Need for Pediatric/Geriatric medical sets (Hurricane Andrew and Mitch, ODS, OIF, OEF)	▪ Artificial blood /oxygen carrying fluids ▪ Protection against bio/chem agents ▪ Common diagnostics for diseases, chem/bio threat ▪ Genomic therapeutics
Medical Treatment	▪ Value of Far Forward Treatment and Surgical Care (Vietnam, OEF, OIF, OJC) ▪ DEPMEDS does not adequately support US Army (ODS) ▪ Level 3 MTFs to heavy, lack mobility, not rapidly deployable (ODS, OJC, Balkans, OEF, OIF) ▪ Support to Coalition forces create additional anticipated medical requirements (Balkans) ▪ MTOE Changes for Level 3 MTFs (ODS, OIF, OEF) ▪ Non-doctrinal use/need to restructure FST (OJC, OEF, OIF)	▪ Miniaturized medical equipment and systems ▪ Non sensory-depriving pain medicines ▪ Single dose multivalent vaccines ▪ Advanced hemostatic control ▪ Single dose multipurpose antibiotics
Medical Regulation and Evacuation	▪ MEDEVAC attachment to aviation units (OIF, OEF) ▪ Value of Rapid Evacuation (Vietnam, OJC, OIF, OEF) ▪ Medical Regulating of Patients Ineffective (insufficient due automation and training) (ODS, OUD, Balkans, OIF) ▪ Difficulties with evacuation in Urban Environment (OJC)	▪ Highly mobile air & ground MEDEVAC systems ▪ Joint individual tracking devices/systems to monitor/locate patients
PREVNTMED and CSC	▪ Value of PM & CSC assets (Vietnam, ODS, OUD, Hurricane Andrew and Mitch, OEF)	▪ Must continue to integrate in operational planning
Medical Structure	▪ Need for change in medical structure to support current battlefield and Full Spectrum Operations (OEF, OIF) ▪ Use Level 2 in split based for dispersed battlefield (OEF) ▪ Level 2 MTFs holding patients for extreme periods, need for hospitalization capability (OEF, OIF) ▪ Lack of training and readiness (ODS, OIF, OEF, Balkans) ▪ Medical training focus on Combat Trauma (OIF, OEF)	▪ Advanced resuscitation & stabilization capability ▪ Lightweight oxygen generation capability ▪ Lightweight composite materials/power sources ▪ Adaptable/mobile systems

[263] The future needs are from *Combat Health Support in 2015* and this monograph, Gouge, 19-25.

In terms of Level 3, this level should be mission and situational dependent. Level 3 assets must focus on either augmenting and/or expanding the capabilities of the forward Level 2 MTFs. Based on METT-TC, level 3 assets could support an AO from STRAT FOB/FOL located in a theater of operations or from CONUS. See Figure 14, *Level 3 Medical Support from US Strategic Forward Operating Bases (FOBs/FOLs),* for a recommendation of Level 3 medical support from a FOB/FOL. In terms of a Level 3 MTF, it should consist of a light and rapidly deployable facility; the facility should be able to easily echelon into a theater based off the threat and/or medical situation within a theater. It must also be able to provide care for all categories of patients, to include resuscitation, initial wound surgery, and postoperative treatment. Currently, the AMEDD is considering a new concept consisting of either a Forward Surgical Hospital or a Forward Area Support Hospital.[264] This seems to be a step in the right direction; however, it is of recommendation that there be a balance between these two concepts. The facility must possess early entry capabilities, but must also possess the ability to further expand its operations in order to meet the potential demands of a contemporary environment.[265]

In terms of Echelon 3, care in the future must still possess the ability for the forward evacuation of patients, to include the proper medical equipment, supplies, and personnel to support the required mission. For those units without medical assets, medical elements would still provide support to those units on an area basis.

[264] Lodi, 44.

[265] *Medical Support for Peace Operations and Humanitarian Assistance* depicts the under coalition operations medical assets often had to hold coalition patients for extending periods of time (90 days), which may cause an increase in hospital beds within a theater of operations, 8. The author also highlights the situation in Somalia when an anticipated jump in casualties created a severe strain on the MTF. The bottom-line is US AMEDD must be highly mobile and flexible, but capable MTF of expanding medical care and beds as required.

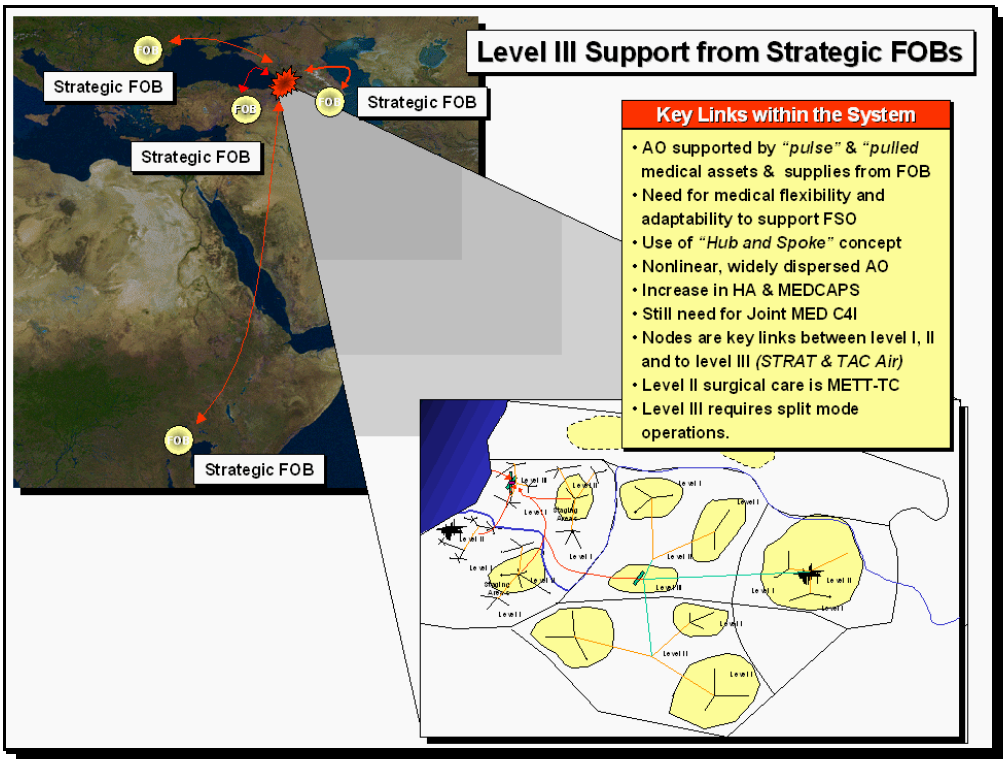

Figure 14-Level 3 Medical Support from US Strategic Forward Operating Bases (FOBs/FOLs)

Another proposal is that Level 4 health care in the future would not exist. Instead, there would be the positioning of Level 3 MTFs across the strategic environment and would replace the Level 4 MTFs. At these transition points, patients would receive assessments and care as required in order to ensure the evacuation to CONUS facilities. The CONUS MTF would then become the fourth level of care and as with the current doctrine would receive patients from a theater of operations within CONUS. The CONUS MTFs would provide definitive treatment until the soldier could be RTD or transferred to a rehabilitative section of the military health care system.

There is also another recommended change in how we provide health care in the future; this is a change to a contemporary concept, which focuses on a *non-linear battlefield* not on the *linear battlefield* of the past. A new concept could potentially consist of a *"Hub and Spoke"* approach in providing Levels 1-3 medical care for an AO. Once the combatant commander receives an alert of potential deployment, medical units would also receive an alert and begin to position medical assets at STRAT FOBs/FOLs.

From these locations, medical units would either provide medical support from or echelon elements into an AO. These assets located at the FOB/FOL would echelon or *"push"* medical support or logistics to the AO as required.

Joint Publication 4-02, *Doctrine for HSS Operations in Joint Operations* highlights HSS in a Joint environment to include the required planning, coordination and synchronization needed for FSO.[266] Past trends have shown this to be a rather negative trend in terms of Joint HSS.[267] To attempt to resolve these issues, there must be an overall Joint Medical Commander when conducting military operations; Joint medical doctrine must also focus on cross leveling of medical assets to prevent redundancy and ensure sufficient and efficient medical care across the spectrum of operations. The Joint Medical Commander must ensure the proper integration and synchronization of these medical assets.[268] Each service possesses medical functional areas and in some cases a specialized quality, such US Air Force ability to provide Inter- and Intra-theater evacuation and the Navy's ability to provide healthcare while afloat. Depending on the mission, the phasing of Joint medical functional areas must occur, based off the requirement and the theater of operations. It is essential that cultural divides be broken and that the integration and synchronization of service medical assets occur to support the mission, and that they are positioned to medically support our forces in the future.[269]

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[266] Joint Publication 4-02, Doctrine of Health Service Support in Joint Operations, July 30, 2001, viii.

[267] OJC and OUD depict some positive trends, but the remaining studies portray a rather negative outlook in terms of joint service planning, integration, and synchronization of medical assets.

[268] The *OTSG OIF 2 Trauma System Issues Brief* highlights the need for an overall unified Joint Medical Command. The analysis was that a Joint command would help reduce redundancy between medical services and improve in cross leveling between units and services. The Joint command would also increase communications and log support, slide 31.

[269] Joint HSS in future operations must attempt to synchronize the medical operational areas depending on the environment and mission at hand. For example, OEF tasked the US Army as the SIMLM for Afghanistan. However, the US AMEDD could not position it medical logistical assets until later phases of the operation. The resolution was the US Air Force help to support the AO with Class VIII, until the US Army, medical logistical assets were operational in theater. In the future, the Joint Medical C4I must phase joint medical services to best support the AO.

Organization

The United States Army Field Manual (FM) 4-02 iterates that theater hospitalization concepts of the future must consist of one joint modularly designed hospital. It must consist of a hospital that is tailorable and can meet the requirement of any mission. It should also consist of functional modules, which can increase in increments broken out into four functional elements—initial response, mobile breakout, core, and mature theater. These four elements when deployed as a whole form a single hospitalization facility, while simultaneously possessing the capability to perform independently as separate entities. As an example, the initial element would most likely include an operating room (OR) to include a central material services (CMS), intensive care, evacuation liaison, and limited diagnostic capability (x-ray and laboratory services) modules. As the theater matures and lift is available for follow-on modules, the HSS commander would deploy these elements in the appropriate number and mix to accomplish the mission.[270] This is an excellent concept; however, this concept should not only be for deploying future hospital modules, but should be a means of organizing healthcare on the future battlefield. It is a recommendation that in the future especially task organized medical packages, with a medical command and control headquarters to plan, direct, coordinate and control health care operations, would support an area of operations and/or theater of operations. These medical packages would deploy to an STRAT FOB(s)/FOL(s) and establish base operations for either non-hostile entry or forced-entry phase of a mission. Then based of mission, additional medical packages could *push* into an AO based off the anticipated medical requirement. As depicted in Figure 14, *Level 3 Medical Support from US Strategic Forward Operating Bases (FOBs/FOLs).*

Training

The level of trauma training of medical personnel will need to improve to properly support the Future Force; this includes both medics and healthcare providers. Not only has historic lessons depicted a

[270] FM 4-02.

great need for far forward care, but it will also be essential on the futuristic battlefield. With the extended LOCs and dispersion of units, the basic medical skills taught to a soldier in self-aid and buddy-aid, to include the training of combat lifesaver and combat medics would be vital in the future.[271] We must look closely at how we are currently training our medics. Current lessons from OEF/OIF reveal that the Combat Medic's *"91W"* training is *"too civilianized"* and thus needs more emphasis on combat injuries (e.g. penetrating trauma).[272] We must also take the time and properly conduct sustainment training from our medics at home station. Reports indicate that the units who have taken the time to train their medical personnel have found an overall increase in their technical and tactical proficiency.[273]

We must also train our physicians in treating combat trauma; most of medical training is concentrated on civilian healthcare. It is crucial that our physicians attend courses such as Tactical Combat Casualty Care, Army Trauma Training Center, War Extremity Surgery Course, ATLS and ABLS. These are vital in the understanding and caring for patients on the battlefields of the future. In addition, this should be a specific requirement for deployment in future operations.

We must not only focus at the treatment perspective, but we must also focus and ensure the proper training of our other medical operational areas such Medical Logisticians and the Medical Regulators to include our Medical Operators and Planners.[274] In fact, reports indicate that medical units often deploy to a contingency mission and later reveal that they were unable to conduct the required training to support the mission. These are training issues that we must now attempt to resolve now in order to effectively support the current and Future Forces of tomorrow.

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[271] Mosebar, 6-7 and Cecchine, Gary, Johnson, David, Perry, Walter, Anthony, C. Ross, Golomb, Beatrice, Hearn, Anthony C., Hilborne, Lee and Solinger, Jerry. *Army Medical Support to the Army After Next: Issues and Insights from the Medical Technology Workshop.* RAND Corporation, Washington, DC: 1999.

[272] The 91W interviewed indicated the need for more combat trauma and skills practice in AIT, OEF 5730. The field recommendations was that the AMEDD C& S 91W training needs to incorporate the challenges of combat, dealing with night condition and fatigue, OEF 5704 and OIF 15279.

[273] Medics need extensive training to include training using the MPT program at home station. The program gives medics experience in critical areas of patient care and an improved grasp of clinical judgment; should include rotation of medics through emergency rooms at home station, OIF 15119, OEF 5626, and OEF 5717. Tactical Combat Casualty Care Course (TCCCC) offered at one unit, states better prepares medics, OIF 15004.

[274] Ibid., 3601.

Leadership Development

The US AMEDD must closely look at their leader development curriculum for leader basic and career development courses. The curriculum must address a Joint service understanding of other service capabilities.[275] We must ensure that the AMEDD Center and School educates our officers so that they possess a general understanding of both US Army medical doctrine. We must also encourage our young officers to take Joint, TOE assignments, and share those experiences with the force. The AMEDD officer must also be able to understand how medical units plan and support FSO. More importantly, they should possess a general understanding of the common terminology of the tactical and operational commander so that they can properly integrate and synchronize our medical elements in an operational environment.[276] The AMEDD of the future will need critical thinkers who can work in an operational environment of ambiguity, an officer who is both technically and tactically proficient and an effective communicator eager to lead our medical forces on the future battlefields of tomorrow.[277] The AMEDD must also intellectually and honestly, review the lessons of FSO and from these lessons continue to advance our medical concepts and systems to best support our army. The AMEDD must study and educate our officers in the lessons of war and conflict. The payoff will be medical leaders who not only understand the medical trends of the past, but leaders who are able to apply these lessons to planning and executing medical support in the future. More importantly, these trends would also be beneficial as the AMEDD transforms its organization to support the force of tomorrow.

[275] A recommendation is that the AMEDD must encourage our officers to attend the Joint Planners Course-3H or the Joint Medical Planners Course (JMPC) and to serve on Combatant Commanders staffs.

[276] The US Army currently has the Project Warrior Program in which the US AMEDD participates. The program takes proven AMEDD officers who have worked in TOE assignments and places them in a two-year assignment as Observer/Controllers (OCs) at the Combat Training Centers (CTCs). Following the CTC, the officers go to the AMEDD Center and School and teach leader development to Officer Basic and Advance Courses. This program allows the OCs to teach the many trends experienced from the tactical environment at the CTCs and to share their wisdom, thus educating the AMEDD officers of tomorrow.

[277] Reports from ODS reflected numerous deficiencies in medical units ability to command and control its operations, a lack of unity of efforts and inadequate training and readiness, ODS 4030, OIF 240 and OEF 5635.

Material

The combat medic of the future will also be required to provide care for lengthy periods. This will require a medic who possesses enhanced capabilities such as the means to insert and maintain airways, support ventilation, and stop bleeding.[278] Technologies for the combat medic in the future must include input systems that enhance the medic's ability to care for casualties. Other technologies must assist the medic in rapid and accurate diagnosis of life-threatening conditions, such as pneumothorax, and provide pharmaceuticals for controlling severe internal bleeding. The medic should be able to use robots to retrieve casualties in hazardous situations, further reducing risk to the medic. The medic should possess retinal displays and voice data input systems that assist medics' and allows them hands to provide essential care.[279] In the next 10 years, new technology will also emerge and assist medics in their efforts; equipment such as hemostatic bandages, oxygen-carrying intravenous fluids, and easily used airway devices. The emergence of canned fibrin, a blood coagulant, will act much like cans of flat tire sealers. A medic will able to insert the nozzle of the canned fibrin in a wound and spray, thus stopping the bleeding.[280] By 2025, the force should also have the benefits of Nanotechnology, which will contribute not only in to overall effectiveness of the medic; but should also make the combat medic more mobile and his combat load lighter. [281]

The AMEDD must pursue its research and use of technology. Such as the Warfighter Physiologic Status Monitor (WPSM) which will assist the medic in locating the wounding of a soldier through its *"911"* button; the system will also allow for the assessment of a soldier's heart rate, respiratory rate, temperature, and *"an index of alertness."* In addition, the WPSM will allow for predictive data of physiologic distress, such as heat or cold injury and exhaustion, enabling commanders to have objective

[278] Center for Healthcare Education and Studies, 21.
[279] Wildzunas and Feister.
[280] Board on Army Science and Technology, Commission on Engineering and Technical Systems, National Research Council, 31.
[281] Don Philpott. *Nanotechnology 101: Tomorrow's Technology- You Want See It Coming.* Homeland Defense Journal. Arlington, VA 2004 and MIT Institute for Soldier Nanotechnologies. Retrieved October 14, 2004 from http://web.mit.edu/smcs/isn/rm-500-ISNOverview.ram

data to help decide which units are most capable of accomplishing missions.[282] The AMEDD must continue to pursue their efforts of research in terms of automated body armor. This system protects the soldier from rounds or fragments. In fact, it will be able detect rounds fired and immediately react and stop the round from entering the soldier's body. However, once the soldier receives an injury, the suite will automatically act and begin an analysis, obtaining vital signs and alerting the command of the injury. The suite will even begin to provide limited healthcare such as basic treatment functions, the delivery of medications and CPR. The US Army and AMEDD are still working the dynamics of this suite called *"Exomuscle"* through the research of nanotechnology.[283] More importantly, the significance of this suite is that in the future the suite will increase the casualty survival rates in the US Army Future Force of 2025.[284]

In terms of inter- and intra-theater medical evacuation (MEDEVAC), the US AMEDD must begin now by looking at potential systems to replace our fleet of HH-60s. By 2025, our MEDEVAC aircraft will be at the point of phasing out; so what do we need of the future? Currently, the US Army is looking at concepts in terms of vertical take-off and landing (VTOL) systems. The US Air Force is looking at various short take-off landing (STOL) systems that would eventually replace inter- and intra-theater aircraft.[285] Nonetheless, it is of utmost importance that the US AMEDD integrates itself into the developmental cycle to ensure that the system is adaptable and allows for the facilitation of medical care. With the extended LOCs, it is critical that the new concept allow for *enroute* medical care in both the inter- or intra-theater evacuation. Patient evacuation by both ground and air will be a significant issue as

[282] Board on Army Science and Technology, Commission on Engineering and Technical Systems, 30.

[283] Nanotechnology is the ability to control, manipulate, create and use structures, devices and systems on the atomic scale. It is estimated that in 10 years the US Army will have its *Exomuscle* that will incorporate sensors to monitor, assess, treat and ultimately protect our US Army Future Force Soldier's, *Homeland Journal 26-27* and *MIT Institute for Soldier Nanotechnologies.*

[284] Ibid., 27.

[285] John Skorupa. *Next Generation Medium Mobility (NGMM) Notional Requirements and Design Trade Studies.* Boeing Company. Briefing conducted September 27, 2004 with the US Army School of Advance Military Studies (SAMS), Fort Leavenworth, KS.

we engage and fight on a widely dispersed and nonlinear battlefield.[286] The anticipated key to successfully supporting our Future Force is efficient far forward medical and surgical care to include the integration of Joint medical systems to assist in the rapid evacuation and treatment of forces within theater. As the battlefield continues to expand, it will present a substantial challenge in our medical support for the future and create changes to our medical concepts and systems, as we now know it. Nonetheless, the transportation to include evacuation of our medical assets and patients will be the crucial link in medically supporting the US Army Future Force in a full spectrum of operations.[287]

Currently, the US Army is attempting to gain full situational awareness through a communications system called Force XXI Battle Command Brigade and Below (FBCB2) system and an Enhanced Position Location Reporting System (EPLRS). In terms of the AMEDD, a current addition to its communications system is the Medical Communications for Combat Casualty Care (MC4), which is a family of systems program. The MC4 is an attempt to automate and link ten army medical department (AMEDD) operational systems, to enhance overall digital communications and promote medical situational awareness to command and control structures.[288] However, reports reveal that the system is not rapidly adaptable to meet current operations. Reports also reveal that in current operations, email is the communication system of choice, but is often to slow to effectively communicate and the bandwidth is too small to send files.[289] In the contemporary environment, Medical C4I must posses a system that

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[286] Current proposals for the Future Combat System (FCS) medical variants will consist of on-board advanced diagnostics technologies, including advanced hemorrhage control, ultrasound diagnostics, oxygen production, suction, advanced monitoring and an evolving patient transport system (CSTAT). It is also the idea, that the FCTC chassis and systems will significantly improve mobility, survivability and connectivity to the digitized force, *Medical Technologies for the Objective Force.*

[287] Brigade General Charles B. Green. *Challenges of Aeromedical Evacuation in the Post-Cold-War Era.* Published Aerospace Power Journal- Winter 2001. Medical Lessons from OEF 5679, OIF 5669, OIF 8008, OIF 15432 and the *Army Medical Support to the Army After Next: Issues and Insights from the Medical Technology Workshop*

[288] It is also the intent of the MC4 system that it will provide an interface through the Global Combat Support System-Army to the Combat Service Support Control System, the Land Warrior programs, Future Combat System, and other current and future Army information systems.

[289] The *OTSG OIF 2 Trauma System Issues Brief* highlights the need for improvement in terms of communication and transfer of clinical data between echelons. A recommendation is the use of 64 Meg thumb drives, which allows acts as the soldier's medical identification tag and patient record. In the future, the combat medic could scan the information into a hand held medical adaptable palm pilot; this would allow the medical

allows for the control of all medical operational areas. It must allow for the control and synchronization of medical assets into a theater of operations; the system must also be Joint compatible in nature. The current employment of the Joint Theater Medical Information Program (TMIP) software applications of MC4 should also assist in linking service components. It is also of hope that this software application of MC4 will facilitate data exchange and support all levels of care such as medical command and control (C2), situational awareness, treatment, medical logistics, casualty movement and health care delivery. Another consideration is that the AMEDD want to consider the use of the *"Command Post of the Future (CPOF)"* as the command and control system for 2025. The 1st Cavalry Division was the first to use this new method in Iraq. The system allowed commanders from battalion level and higher to feed real-time situational awareness into the system and have that information available in text and graphic representation immediately by fellow commanders and operations officers at all levels.[290]

Nevertheless, we must attempt to eliminate any of the discovered deficiencies from current operations and focus on systems that can effectively support the US Army Future Force. The medical assets for the Future Force must have a seamless system for integration, from point of injury to the highest level of care, more importantly the system must link health care providers, medical diagnostic systems, information, and command and control systems at all echelons.

Personnel

The success or failure of medical operations in the future will depend on quality well-trained and prepared personnel who possess the right skills. Medical support in the future operating environment will not only involve medical care for soldiers, but potentially the care of US civilians as well as numerous indigenous populations when supporting an Full Spectrum Operation. It is crucial that the US AMEDD

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regulating system to track the soldier from Level 1 to the higher levels of care. In addition, healthcare providers could also provide updates to the record as needed so that the next level of care would be able to review previously treatment, slide 12-15, 30 and 37.

[290] Kathleen T. Rhem. *Armed Forces Information Service, New Articles.* Division Uses Command Post of the Future. American Forces Press Service, Baghdad, Iraq: June 2004.

continue to seek and select high quality recruits who are capable of understanding and providing health care in contemporary environment.

Facilities

Facilities are the final component of DOTMLP-F. In terms of facilities, since this monograph focused on the Levels of Care I-III it will not address the higher facilities located in CONUS. However, we must use the existing facilities such as the Combat Training Centers and simulation centers should incorporate all potential medical functional areas in order to train our HSS in the future. We might also want to consider how we train our PROFIS in our medical fixed facilities, since lessons from OIF and OEF depicts the AMEDD as deficient in certain skills when supporting a Full Spectrum Environment.

In conclusion, Force Health Protection in a Global Environment will be integral to ensure the health of our US Army Future Force in 2025. However, we must take these trends from the past and realistically analyze the future in order to determine the support required for the force of tomorrow. Interestingly, is that most of the medical issues held within the past, continue to be our issues for the future. Another key to transforming our medical force is that the US AMEDD cannot afford to be neither culturally biased nor possess a political agenda as it looks to the future. We must ensure that there is Joint service integration not only of our medical systems and equipment but also in our planning and execution for operations in the future. Additionally, if recent experiences in Iraq and Afghanistan are of any indication is that the US AMEDD will continue to play a vital role in US military operations.

This monograph holistically examined the problems, challenges of past medical trends starting with the Vietnam War, and attempted to analysis the medical issues of the future. These overall experiences and estimates provided a set of medical lessons and issues that are common to every military operation. The result of the monograph was set of DOTMLP-F proposals for improving FHP for the US Army’s Future Force in 2025.

Appendix 1. Medical Course of Action Tool (Casualty Analysis/Estimate for US Army Vignette)

Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PAR	24,000	24,000	24,000	24,000	29,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000
	Insert	Insert	Insert	RSOI	RSOI	RSOI	RSOI	RSOI	Decisive	Decisive	Decisive	Decisive	Decisive	Decisive	Decisive	Decisive
	Forced Entry Operation				US Forces prepare for DE Ops				OPFOR conducts conventional attacks				OPFOR conducts asymetric attacks------			
US/OPFOR Actions				Forces continue deploy condcut RSOI					US Forces conduct DE Ops					US Forces secure city and key		
					Additional forces deploy into theater as required----------											
Battle Cas Rate																
Level 1 Arrivals	**495**	**129**	**111**	**126**	**135**	**158**	**180**	**158**	**183**	**183**	**158**	**158**	**158**	**200**	**183**	**180**
Level 1 RTD DNBI	9	9	9	9	12	13	13	13	13	13	13	13	13	13	13	13
Level 1 RTD WIA & Airborne	224	3	0	2	0	0	3	0	4	4	0	0	0	6	4	3
Level 1 Evacuated to Level 2	262	117	102	115	123	145	164	145	166	166	145	145	145	181	166	164
Level 2 RTD DNBI	86	86	86	86	105	123	123	123	123	123	123	123	123	123	123	123
Level 2 RTD WIA	5	3	0	3	0	0	4	0	4	4	0	0	0	7	4	4
Level 2 FST cases	46	2	0	2	0	0	3	0	3	3	0	0	0	5	3	3
Level 2 Evacuated to Level 3	171	28	16	26	18	22	37	22	39	39	22	22	22	51	39	37
ESG Level 2 Treated	**63**	**63**	**63**	**60**	**73**	**88**	**121**	**88**	**85**	**85**	**85**	**85**	**85**	**121**	**121**	**85**
ESG Level 2 RTD DNBI	54	54	54	51	62	75	72	75	72	72	72	72	72	72	72	72
ESG Level 2 RTD WIA	0	0	0	0	0	0	9	0	0	0	0	0	0	9	9	0
ESG Level 2 Evac. To Level 3	9	9	9	9	11	13	40	13	13	13	13	13	13	40	40	13
Level 3 Admissions	180	37	25	35	29	35	77	35	52	52	35	35	35	91	79	50
Level 3 RTD DNBI	11	11	11	11	13	16	16	16	16	16	16	16	16	16	16	16
Level 3 RTD WIA	15	1	0	1	0	0	4	0	2	2	0	0	0	6	4	2
Level 3 Surgical cases	77	6	0	5	0	0	21	0	9	9	0	0	0	28	22	8
Level 3 Evacuated to Level 4	154	25	14	23	16	19	57	19	34	34	19	19	19	69	59	32
TSC Level 2 Treated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSC Level 2 RTD DNBI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSC Level 3 RTD WIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSC Level 2 Evac. To Level 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Level 4 Evacuated	154	25	14	23	16	19	57	19	34	34	19	19	19	69	59	32

Days	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
PAR	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	
	Decisive	Decisive	Decisive	Stability	Stability	Stability	Stability	Stability	Stability	Stability	Stability	Stability	Stability	Stability	
			OPFOR request cessfire/US Forces transition to SOSO												
US/OPFOR Actions			US Forces conducts SOSO----------												
	Additional forces deploy into theater as required----------														
Battle Cas Rate															
Level 1 Arrivals	**158**	**112**	**112**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**921**
Level 1 RTD DNBI	13	10	10	4	4	4	4	4	4	4	4	4	4	4	77
Level 1 RTD WIA & Airborne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Level 1 Evacuated to Level 2	145	102	102	45	45	45	45	45	45	45	45	45	45	45	844
Level 2 RTD DNBI	123	86	86	38	38	38	38	38	38	38	38	38	38	38	713
Level 2 RTD WIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Level 2 FST cases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Level 2 Evacuated to Level 3	22	16	16	7	7	7	7	7	7	7	7	7	7	7	131
ESG Level 2 Treated	**85**	**85**	**85**	**49**	**49**	**82**	**49**	**49**	**49**	**82**	**49**	**49**	**49**	**49**	**860**
ESG Level 2 RTD DNBI	72	72	72	42	42	42	42	42	42	42	42	42	42	42	678
ESG Level 2 RTD WIA	0	0	0	0	0	8	0	0	0	8	0	0	0	0	16
ESG Level 2 Evac. To Level 3	13	13	13	7	7	32	7	7	7	32	7	7	7	7	166
Level 3 Admissions	35	29	29	14	14	39	14	14	14	39	14	14	14	14	297
Level 3 RTD DNBI	16	13	13	6	6	6	6	6	6	6	6	6	6	6	108
Level 3 RTD WIA	0	0	0	0	0	3	0	0	0	3	0	0	0	0	6
Level 3 Surgical cases	0	0	0	0	0	13	0	0	0	13	0	0	0	0	26
Level 3 Evacuated to Level 4	19	16	16	8	8	30	8	8	8	30	8	8	8	8	183
TSC Level 2 Treated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSC Level 2 RTD DNBI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSC Level 3 RTD WIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSC Level 2 Evac. To Level 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Level 4 Evacuated	19	16	16	8	8	30	8	8	8	30	8	8	8	8	183

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